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"CONSERVATION OF WILD LIFE THROUGH EDUCATION"

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A BIOLOGICAL SURVEY OF LAKE TAHOE

By GEORGE A. COLEMAN.

To the biologist, Lake Tahoe and vicinity offer one of the most extensive and complicated studies of lake community life that can be found anywhere in the world.

The results of the U. S. Hydrographic Survey of 1922 and previous surveys have been brought together in chart form which is now available. This serves as a reliable basis for our biological explorations and for the subsequent charting of the plant and animal life of the lake.

This survey shows a series of shelves running nearly around the lake, *viz,* first, a comparatively shallow margin, 15 to 160 feet in depth, which usually has a fine sandy or gravelly bottom, except where the banks are steep, in which case the rocks extend for some distance out. The next shelf is at a depth of 500-750 feet; the third at 1000 to 1250 feet. Then the great bottom basin which covers three-fourths or more of the lake at from 1250 to 1645 feet, the greatest depth found in the lake.

The temperature of the water varies from 130°F. in the immediate vicinity of the Thermal Spring at Brockway to that of freezing, 32°F., and sometimes (notably this winter) the water in some shallow bays, such as immediately in front of Tahoe Tavern, freezes over sufficiently to allow skating. One winter, Emerald Bay was almost covered with such a film of ice. The water coming in from all the streams is ice cold up to June, when it begins to warm up a little, never getting

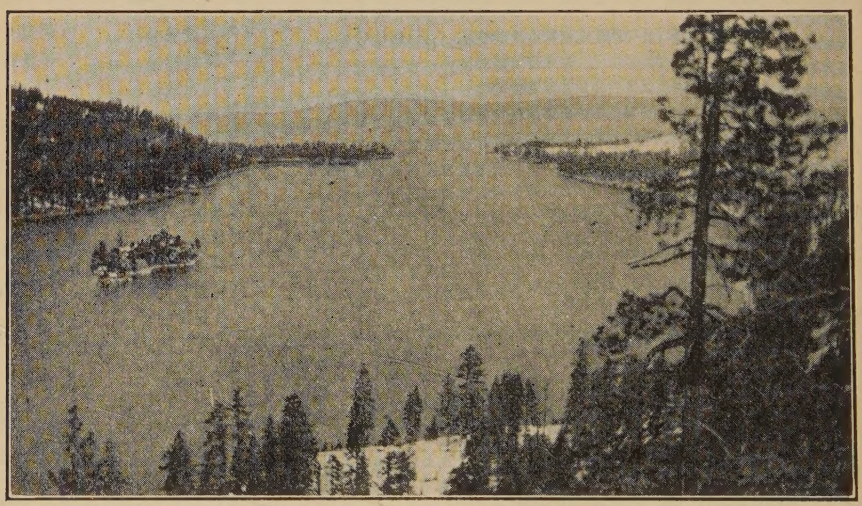

Fig. 28. Emerald Bay and Lake Tahoe, famous for the Tahoe trout. Photograph by J. H. Sanders.

much above 55°F., however. It takes considerable circulation of the warm water of the northeast and southeast parts of the lake to warm it as a whole to any appreciable extent.

There is a wonderful color variation in different parts of the lake, depending largely on the character of the bottom: all the way from a light yellowish-green to an intense blue, and sometimes, notably at sunset or sunrise, all the colors of the rainbow can be seen.

The water is the clearest of any lake in the world. When it is perfectly quiet an ordinary white dinner plate can be seen on the bottom at a depth of more than 100 feet.

There is a comparatively short season in which one can work with any degree of safety, or comfort, *viz,* May 1 to October 1, and at any time during these months, one may encounter sudden wind, rain and hail storms. I have started out in perfectly calm, bright weather and have been driven to shelter in an hour's time by a violent wind and

hail storm. Working under such conditions, progress is necessarily slow. The great distances to be covered in a day's work is another factor to be considered in the progress of the work.

The method of conducting the biological survey so far has been to work out from a number of the resorts located around the lake, beginning with Bijou at the southeast end and working around to Brockway at the north end, thus covering all the lake on the California side. In this way, a comparatively narrow strip entirely around the lake has been explored and what we might call the shore fauna and flora studied. From the food standpoint, however, this study is fundamental, since the food of all species of trout inhabiting the lake consists of the various species of minnows and other small fish which inhabit and find their food in these shallow waters and upon their condition depends the condition of the trout in the lake. Considerable data have also been obtained by examining the stomachs of trout brought in during the season by fishermen at the different resorts.

The plankton net survey at various points shows a comparatively poor supply of zoo-plankton, only 1-1000 part as much per cubic foot as that of Clear Lake in Lake County, for example.

One curious thing, although it probably has a perfectly natural explanation, is that during one month, perhaps only one species of copepod will be very abundant. Early in April, for example, a brick-red species of Diaptomus is so abundant as to color the water in certain areas. Then it almost entirely disappears, to be followed by some other species.

Another remarkable thing is the daily depth fluctuation of these various species making up the zoo-plankton, some species going down to a depth of 75 feet or more during the day and reappearing at the surface at night.

All of this has a direct influence on the movements of the trout in the lake, since they follow the movements of their food in both their daily and seasonal fluctuation. The winter movements and habitat of the minnows have not yet been studied; all we know is that they disappear about November 1st from their summer haunts and we do not see them again until about May 1st. Where the young lake trout which are planted in the streams spend the winter is also a mystery. The streams in winter seem to be perfectly clear of them and yet they appear in the streams as soon as the high water is gone in the spring.

The causes for the lessening number of Tahoe trout in the lake have been many and various. The first, and perhaps the greatest single factor, was the commercial fishing which was carried on for a number of years, when they were shipped out by the tons. Then intensive sport fishing, both in the lake and in the tributary streams, took its heavy toll. As to just how heavy this was, may be noted by the fact that in the year 1900, our records show, 58,667 pounds of Tahoe trout were shipped from the lake itself, about nine-tenths of them being the real Tahoe trout (*Salmo henshawi*), which averaged about two pounds in weight.

In recent years, since the auto has replaced the pack animal as a means of getting to our mountain streams, the greatly increased fishing during the summer months has taken the young trout of the tributary streams just as fast as they could be planted, so none have been left to grow up to sufficient size to stock the lake.

However, notwithstanding all of these handicaps, the two trout hatcheries maintained at the lake by the Division of Fish and Game for the purpose of stocking these streams with young fry are getting results. This is attested by the fact that every year an increased number of eggs are taken from females caught in the traps, beginning about March 15 and continuing until June.

If all the tributary streams are closed to summer fishing for a few years, and these streams stocked heavily with nothing but Tahoe trout fry, undoubtedly the lake will be stocked with this native trout. This would also give us a chance to study the life of this native species in the stream under natural conditions and obtain some very necessary data as to its habits of life.

The Mackinaw trout, and steelhead which have been introduced into the lake are thriving amazingly, especially the Mackinaw, which is now the summer sport fish, forming about nine-tenths of the catches of the summer tourist, and a fine fish it is. It is a bottom feeder and subsists mainly on minnows, chubs and bullheads, with some aquatic insect food. It does not appear to be destructive to the young lake trout.

The steelhead is gaining a foothold and during the season of 1927, many two and one-half pounders were caught. Females of five to six pounds ready to spawn were quite often found in the shallow waters of Cornelian and Crystal bays.

A SPORTSMAN VISITS THE YOUNTVILLE GAME FARM

By F. W. Lochne.

If any lover of the sport of hunting with the scatter gun has any regrets over the increase of price of the hunting license, a visit to the California State Game Farm, near Yountville, will go a long way toward dissipating that feeling, and he must feel that at least a portion of his money is being wisely spent.

Situated at the upper end of the Napa Valley, the first impression on arrival at the Game Farm is one of intense pleasure. The setting is ideal for this enterprise—the latest effort of the State Fish and Game Commission to render to the sportsman a portion of the service which is his due.

Improved roads and increased facilities of travel have greatly reduced the discomforts and troubles of a day afield. Many, who formerly were too indolent or indifferent to accept the little plaguing privations and hardships, have changed their minds and are now enjoying a holiday by tramping the fields in company with the old timers and, perhaps, a faithful dog.

These extra guns and dogs have increased the casualties among the feathered flocks the old timer sought and to offset this, the propagation of game by artificial methods seems the natural sequence and remedy.

It does not take an expert eye to see that the Game Farm is living up to expectations. If the visitor is fortunate enough to arrive at a time when the superintendent, August Bade, can conduct him about the place explaining the salient features, he will find Mr. Bade a genial host, and the time well spent.

The farm, as a whole, covers roughly about two city blocks, all under wire, divided by passages, and has removable wire partitions between

the pens. It is irrigated by piping water from the creek above. The gravity pressure is sufficient to provide a gentle shower throughout all the pens if necessary or any part of the farm as needed. This is made possible by an arrangement of valves along the main passageways without unnecessary disturbance of the birds.

Undoubtedly the first things the visitor is impressed by on entering the enclosure are the ornamental varieties of pheasants—beautiful birds of every imaginable color and shade. Golden, Silver, Lady Amherst, Reeves pheasants and different crosses of all of these are present. Though timid and nervous by nature, the pheasant makes a splendid display bird. The males, with their brighter plumage, seem to take a delight in parading before the admiring gaze of the visitor. Endowed by nature with the habit and patience of taking great care of their plumage, they offer the suggestion of being capable of knowing well how to make excellent use of a vanity case.

Ring-necked pheasants are, of course, present in greater numbers. This is the bird that the sportsman is perhaps most interested in. Hence, this variety is being intensely propagated for the purpose of restocking the game covers of the state for the benefit of present and future generations of sportsmen.

The birds now being propagated are a distinct improvement on nature, for by judicious selection of the best individuals and by the crossing of the Mongolian and ringneck varieties, a decided increase in size has been attained. It is not unusual for birds one year old to weigh as much as four pounds. This applies to both male and female, although the male, on account of the longer tail and more brilliant coloring, appears larger than the female. The Mongolian and the ring-necked pheasants are two distinct varieties. The casual observer, however, would find some difficulty in discerning the different features which set them apart.

Still another variety, and a recent acquisition to the farm, is the Japanese versicolor pheasant. This is a handsome bird with mainly dark blue and green plumage. The superintendent seemed very joyous at possessing it for the reason that he thought the interbreeding of this variety would produce a smarter and more wary bird than the ring-necked pheasant. The protective coloration of this offspring is, further, thought to be more suitable for the cover in this state.

While admiring this beauty, we heard the call of a quail. After remarking to Superintendent Bade that it seemed somewhat peculiar, he took me over to the pen from which the call came and stated that these were desert quail, quite similar to our regular valley quail in appearance and size.

We next went to the pens of the Hungarian partridge. I long for the day to come when I can see my dog come to the point on one of these birds, when I may come up with the "old scatter" gun, flush this bunch of feathered dynamite and see him rise from cover with a speed which, I hope, will never cease to thrill me.

These partridges are larger than our quail, duller in plumage, and are not distinctively marked as to sex. Unlike the ring-necked pheasant, they are not polygamous. Superintendent Bade says that in mating they are persistent in their refusal to be artificially mated and make their own selection. If forced mating is tried, it only results in

the death of the male. Truly, this is another example of the "female of the species being more deadly than the male." In mating time the flock is allowed the run of several pens by removal of the partitions. The birds roam about at will in one large flock, but, when in due time, a pair have come to an agreement, they leave the main flock. By means of an ingenious device, the mated birds are captured and placed in a private breeding pen. Here they assume the duties and responsibilities of matrimony.

We next came to the pens containing birds from South America. If I remember rightly, they are called tinamous. Superintendent Bade seemed to be particularly delighted with them and stated that California has the only game farm having them of which he knew. These birds were in three sizes but are seemingly alike in all other respects. The largest is about the size of the prairie chicken, and very similar in appearance. Some new arrivals have a crest or topknot, which slopes backward instead of standing upright as it does in our mountain quail. The smallest bird is about as large as the western mourning dove, and the third about midway between the two. They represent an entirely new experiment, the results of which are, of course, uncertain, but assuredly, most interesting.

We were then conducted out of the main enclosure to an outside series of pens, where there was a small flock of wild turkeys, three hens and a gobbler. The gobbler, a recent arrival from Arizona, was a noble bird weighing nineteen pounds, although but a year old.

On returning through the main enclosure, Superintendent Bade called our attention to a pen containing ringneck doves, and also to some of our native doves, which, he explained, had become inmates in an unusual way. The Game Farm serves as an attraction to many varieties of birds and these native doves had voluntarily entered the pens. The wire mesh, being of good size, permitted them to pass through when their wings were folded, but was too small to allow them to escape when extended. When attempting to reach the outside, they invariably flew against the wind. Consequently they had become prisoners. They seemed perfectly contented, however, and were remarkably tame.

The poultry yard is somewhat removed from the main enclosure. Here the foster mothers for the young pheasants are produced. Bantams and their crosses make the best mothers. One desired type of small hen has been devoloped by crossing the Japanese Silkey with a selected variety of bantam.

In a separate enclosure there was a large flock of valley quail. Beautiful representatives of California's royalty, they are kings of the upland and the sportsmen's delight. The entire flock was near the part of the enclosure we were approaching, it being near feeding time. Probably alarmed by the presence of a stranger, they took wing and flew to the other end—a glorious sight. Superintendent Bade asked me for an estimate of their number, and, after a short pause, I placed it at 250. Now I tried to allow for natural extravagance in making this estimate, and thought, if anything, I underestimated. You may imagine my chagrin when informed the number was just half.

By this time, the afternoon was near its close. I got into my car and pursued my journey to the Sacramento Valley, accompanied by the most pleasant thoughts and anticipation of days to come.

SOME CRUISES OF THE ALBACORE

By Paul Bonnot.

(With four photographs.)

One of the least known activities of the Division of Fish and Game is the sea patrol maintained by the Department of Commercial Fisheries. For the last few years this patrol has been carried on by the motor boat *Albacore*. The *Albacore* is 65 feet long and obtains her motive power from a 65 horsepower Diesel engine. There are comfortable accommodations for six men in the cabin. The territory regularly covered consists of the ocean waters south of Point Concepcion to the

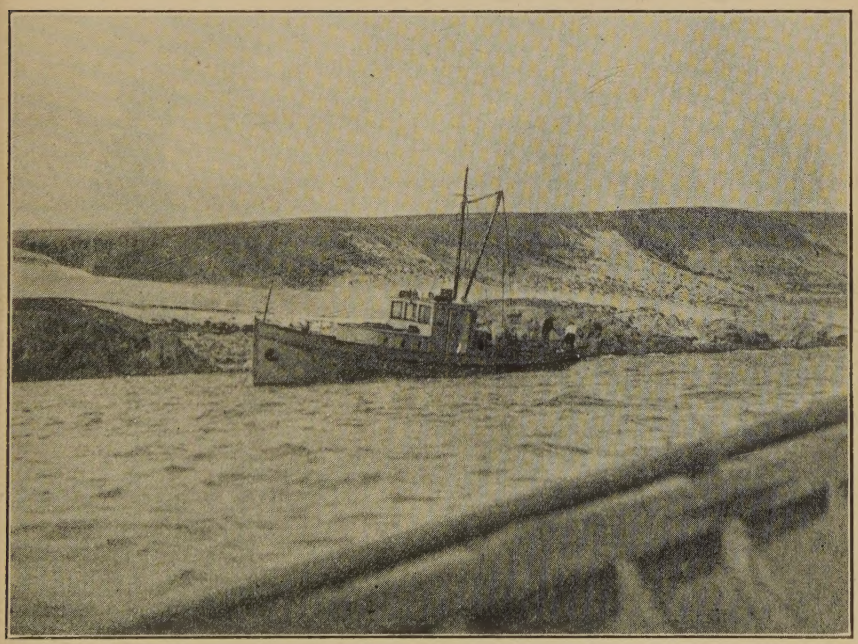

Fig. 29. Patrol boat *Albacore* in Tyler's Bight, San Miguel Island. Photograph by Okeson Bonnot.

Mexican line. Besides her regular patrol the *Albacore* now and then is employed in scientific research in connection with commercial fisheries.

On June 3, 1927, the *Albacore* put to sea from San Pedro on a cruise for the study of marine mammals. The itinerary included the coast of the mainland of southern California and the outlying islands from Point Piedras Blancas in San Luis Obispo County to the Mexican line. The crew consisted of Captain Walter Engelke, a genial companion and a first class navigator; Max Tritch, the very capable engineer, and Fred Wack, steward and cook. My brother, Okeson Bonnot of Los Angeles, was official photographer and I was to learn all I could concerning marine mammals.

The first day out was not auspicious either for photography or the advancement of learning, inasmuch as the representatives of both these

departments did not enjoy their meals and were rather skeptical regarding their future ability to assimilate nourishment.

For three days we worked north along the coast looking for sea lions.* The sea was calm and we found good anchorages at night. The time passed very pleasantly. We arrived at Point Piedras Blancas about 10 a.m. It was clear and warm. After completing our work, the anchor was raised and we started for San Miguel Island. The screw had turned over only a few times when there was a tremendous jolt and a loud thumping under the stern. Investigation revealed the lower half of the rudder gone. We set a course for San Pedro and a drydock. It was 2.30 p.m. when we got under weigh and for twenty-two hours the little *Albacore* pounded out her nine knots an hour. We took turns at

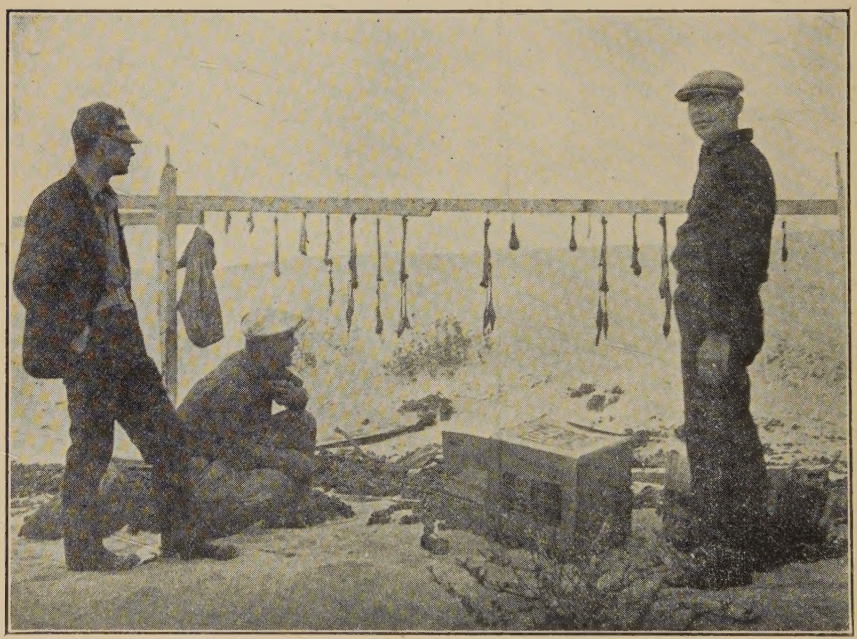

Fig. 30. Confiscated sea lion trimmings taken on San Miguel Island, where it is unlawful to kill any sea lions. Photograph by Okeson Bonnot, June 10, 1927.

the wheel and the cook kept the coffee pot hot. The fog shut down an hour from Piedras Blancas and we ran nearly the rest of the distance through a wet gray blanket which only lifted when we had Point Vincent abeam. We put her on the drydock at once and while the new rudder was being installed we cleaned and painted the bottom. Two days later we put to sea again. It was afternoon before we got away, and to save time we planned to run all night. By 11 p.m., when we were abreast Santa Cruz Island, one of the channel breezes began to blow and the *Albacore* began to understudy a submarine. We put in to Pelican Bay and went to sleep. When we rolled out the next morning

*The data relating to sea lions acquired on this cruise has been published. Bonnot, Paul. The Sea Lions of California. California Fish and Game, Vol. 14, pp. 1–16, 10 figs.

the sun was shining through the ports and we could hear birds singing on shore. The bay was as unbroken and serene as a pond and the boat lay without motion. A mile out in the channel, however, gray banks of fog were scudding before the wind.

We got under weigh at 6 o'clock and continued our course of the night before, running close to shore to gain as much shelter as possible from the wind. As we finish breakfast we determined to run through the channel between Santa Cruz and Santa Rosa islands, which would allow us to run west under the lea of Santa Rosa and San Miguel. The wind was from the northwest. The course was changed accordingly and she came about and into the trough; of course she began to bury her scuppers at once. The breakfast dishes were still on the table and the second roll deposited most of them on the cabin floor. The burst of profanity which came up the companionway was no doubt very relieving to the cook's feelings. We grinned at each other and kept to leaward of him the rest of the morning. At 2 p.m. we anchored in Adam's Cove under the west end of San Miguel. A heavy sea was running from which we were only partly sheltered and the boat rolled heavily. We were forced to remain here two days on account of the heavy sea which pounded the rocks and reefs about us. We put in the time exploring the island.

After two days enforced stay the wind went down somewhat and we cautiously began to investigate the outlying rocks. Huge beds of kelp concealed sunken reefs which would have broken us in two. A heavy ground swell ran through the kelp, which rose and fell with here and there the point of a black rock showing in the hollows. It made for jumpy work. One of us was always under the bows and we ran very slowly.

At nearly all the places we wished to work it was necessary to land on the jump. The captain or engineer handled the dory which they would back in against a likely looking rock. My brother or I would take the jump at the right instant and the boat would pull away until the next wave. When we were both unloaded the boat would remain in the vicinity until we were ready to embark again, when the same program would be gone though with. Only once during the trip did any of us get wet. This was at Flea Island, off the west end of San Miguel, when I slipped on a landing and went in to my waist, with a straight drop below into ten fathoms of water. I still had a hand hold and my brother above me on the rock reached me a hand so I avoided a swim.

From San Miguel Island we worked south to the rest of the islands. We had fine weather for the most part and were quite successful in obtaining data on sea lions and many fine photographs.

During May, 1928, the *Albacore* was ordered north to Eureka, to enforce the closed season on the outside trolling of salmon. When the season for salmon trolling opened on June 1st, we were to work south making another survey of sea lions. The weather was rather squally during the run from San Pedro to San Francisco. Everything was wet above and below and the crew all in. I boarded the boat at San Francisco and helped dry out the bedding and take on supplies. On the morning of May 5th we crossed the San Francisco bar and set a course north. The run up the coast was uneventful. In passing several of

the more prominent capes we encountered wind squalls, but they were of local intensity and for the most part we ran our nine knots over a smooth sea. We crossed the Eureka bar next morning (Sunday) at 8.30 a.m.

For a month we patrolled the coast from Shelter Cove to the Oregon line with Eureka as a base. The Humboldt bar, celebrated in stories of the Pacific coast, lived up to its reputation. It is smooth only in

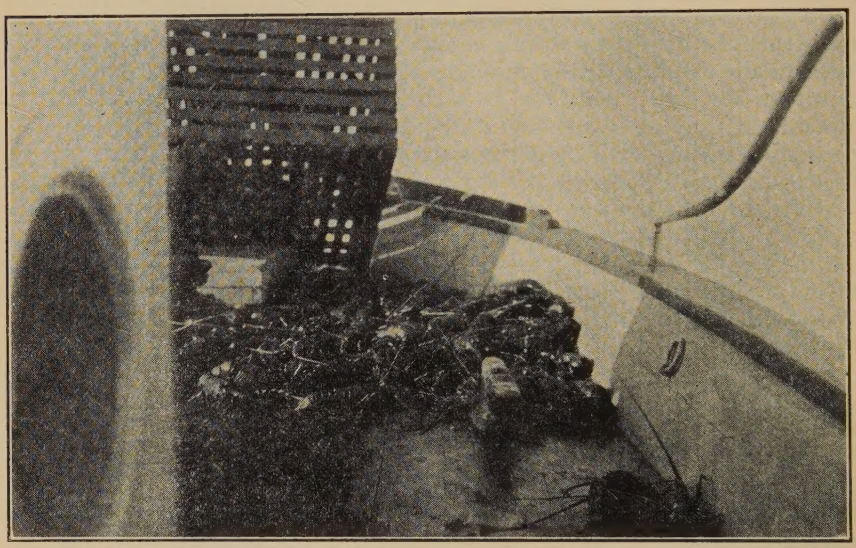

FIG. 31. Confiscated, undersized spiny lobsters, 125 in number, on deck of *Albacore*. These crawfish were confiscated from a lobster "receiver," picked up in the kelp beds of Redondo Beach. Photograph by Paul Bonnot, November 28, 1927.

extremely fine weather. Fortunately we were favored with a good sea each time we crossed and so met with no mishap.

One morning we crossed into a northwest sea which, though smooth, was decidedly high. The Albacore rose to an unusually high one, shoved half her length into very thin air, rolling to starboard at the same time and fell with a crash that put the bow under water and caused an explosion of wrath from below. The cook, Ernest Schmidt, was preparing lunch and, being below, had had no inkling of what was going on until she began to stand on her head. He came up the companionway breathing fire and slaughter. "It's not so pad ven de dum stew slides off the stove, put ven it yumps off," and so on. However, we were more disturbed when we discovered that the radio loud speaker had been thrown from its shelf despite its screws, and we were without music. The radio was our means of relaxing taut nerves. Many nights we lay in lonely windswept coves and passed several pleasant hours in playing "500" and listening to the music before rolling in.

The northern coast is cold even in summer and it was seldom that the ocean was not covered with a gray swirling fog. The coast line is

bold for the most part and there are outlying rocks in the most unexpected places, making inshore navigation a matter of extreme watchfulness.

We made seizures of illegally caught salmon. These were all made, perforce, inside the bay due to the danger of two boats approaching each other too closely outside in the heavy swell which is nearly always present.

On May 30th we left Eureka for the south. It was a clear day. The bar was smooth and we went out in good shape. As soon as we left the shelter of the jetties, however, we found that we had taken on something. There was a northwest wind that amounted to almost a gale. A huge sea was running, and before this we scudded all day. It made steering a matter of extreme nicety as the sea was quartering from behind and the boat slid stern first into the trough as each big sea passed under her. It would not have done to let her broach to and take a sea. She did take a small one about 3 p.m. Luckily the engineer had the aft hatches closed and little water was taken between decks. As it was, the water was knee deep in the alleys for a few moments. She responded sluggishly to the wheel until she shook herself free.

FIG. 32. The *Albacore* overhauls fishing boat with illegally caught salmon, in Humboldt Bay. This boat had several hundred pounds of small fish. Photograph by Paul Bonnot, May, 1928.

At 7 p.m. we rounded the buoy at Mendocino City and dropped the hook, tired out. To those who have not had experience on a small boat at sea it might be well to explain that the continual motion is very wearing. There is always an unconcious bracing and checking of the body muscles to conteract the rolling and pitching of the boat which leaves a bodily weariness at the end of the day similar to that caused by hard physical labor.

The next two days were fairly good running. Off the prominent points we generally had a puff of wind, but between it was usually smooth with a long, easy ground swell. We passed whistling bouys doing their duty nobly. To me there is something rather fine about a whistling buoy. Night and day, year in and year out, they lie on the same reef; straining at their anchors in roaring gales; washed and pounded by heavy seas, but always sending out through the fog and night their full throated bellow of warning.

During the fall and winter months the *Albacore* is very busy about the channel islands. One of her greatest troubles is the lobster fishermen. Lobsters are taken in traps about the islands and along the coast and are kept in live cars or "receivers" until a pick-up boat calls for them. The "receivers" are slatted crates of varying sizes which are anchored among kelp. They generally float on the surface. The legal size of marketable lobsters is from ten and one-half to sixteen inches. It is very difficult for the average lobster fisherman to throw back under or oversized lobsters and the *Albacore* is kept busy inspecting "receivers." Now and then a "receiver" is picked up which yields several hundred illegal lobsters. There are also the "sooners" who trap the crustaceans before the opening of the season and rush them in on the opening day, thus obtaining a top price. The traps must be buoyed so that the owner can find them again, and the patrol boat's crew are experts at distinguishing a trap buoy from a bit of drift wood. The traps of "sooners" when found are broken up. Two years ago eighty-six traps were lifted and destroyed along the coast just north of Point Loma in one afternoon. On the east side of Catalina Island, closed to any form of commercial fishing, eighty odd traps were broken up a few days before Christmas last year.

Those whose nautical experience has come to them through the perusal of charming tales of the sea may envy the lot of such men as Captain Engelke and his crew. Perhaps to deep water men the life on the patrol boat would be a holiday, but my experience has caused me to give thanks that I did not chose the sea as a means of livelihood. A month of it is all right. To a landsman there is a certain amount of novelty and a great deal to be learned, but as a steady occupation it loses its charm. After sleeping in wet bedding which could not be dried because of fog; eating at a table that was sometimes almost overhead and on which the china occasionally leaped agilely about, and sitting for hours braced in a corner, contemplating a heaving expanse of water while the boat plunged and quivered in a head sea, I have come to the conclusion that men who "go down to the sea in ships" must have that something in their makeups which permits them to sustain with patience and fortitude the capricious whims of their jealous mistress.

THE SPAWNING SEASON OF THE CALIFORNIA BARRACUDA

*(Sphyraena argentea)**

(With six graphs)

By Lionel A. Walford.

For the past two years, 1927 and 1928, the writer has made observations in the fresh fish markets of San Pedro on the California barracuda, a food fish of considerable importance to the fresh fish industry of the state. The work was initiated and the preliminary investigation was begun in 1926 by the International Fisheries Commission, United States and Mexico, but no data for that year are here included. This paper is published as one phase of the barracuda investigation, which will be reported upon fully at a later date.

Market observations in 1927 were not begun until June first, and 16,500 fish were examined during the remainder of the summer. In 1928, 18,000 fish were examined, and the work extended from March until October.

In studying the spawning season, the method employed was to make daily observations and records of the degree of maturity of each fish in samples taken in the markets, which degrees in the females were classified into the following four groups:

Group *a*. Fish immature, or only partially mature, the ovaries revealing either few visible eggs or none at all.
Group *b*. Fish in which maturity is well advanced, and in which the ovaries are full of opaque eggs.
Group *c*. Fish with running spawn.
Group *d*. Spent or partially spent fish.

The ovaries of the barracuda are approximately one-third the total length of the body, are paired, and in shape cylindrical, with tapering ends. The diameter of the ovary of immature fish is about one-fiftieth the length; of the mature fish about one-eighth. Ovaries of immature fish (group *a*) show no granulation, are pinkish in color, somewhat gelatinous in texture, rather translucent and slender in girth. As maturity approaches, the eggs appear as small, yellow granules, increasing in number until the gonad becomes considerably enlarged and full of yellow eggs, of which the largest average about 1.3 mm. (group *b*). This is the stage in which the ovaries are of commercial importance as roe, a valued table delicacy. At spawning time, the eggs lose their yellow color and become translucent, assuming the appearance of cooked sago (group *c*). They become enlarged until they average about 1.6 mm. and when the belly is pressed, the eggs flow forth freely from the gonoduct. At this stage, the gonads are of no value as food and lose their commercial importance. After spawning is completed, the remaining developed eggs are probably reabsorbed, and the ovary rapidly diminishes in girth; its substance becomes flaccid, its color pink, and finally its appearance and structure become the same as in the immature fish of group *a*. These stages in the spent fish appear only late in the season, and describe the condition classified

*Contribution No. 76 from the California State Fisheries Laboratory, January, 1929.

as group *d*. There is, however, no line of demarcation between spent fish (group *d*) and immature fish (group *a*) and the spent of the end of one season become the immature of the beginning of the next. With such simple and obvious classes of degrees of maturity, it has been an easy matter to make records each day in the markets while the fish were being cleaned by the market butchers.

The testes are approximately the same size as the ovaries, but differ in their shape, which is roughly prismatic. The classification of the males according to degree of maturity is somewhat more difficult and includes three divisions: immature, mature and spent.

The testes of the immature male are firm in texture, slender and pale brownish or greenish in color (group *A*). As the sperm mature, the gonads become larger in size, whiter in color, and less firm in texture (group *B*). When the belly of a mature male is pressed, the lactescent milt exudes through the gonoduct. After spawning is completed, the testes rapidly become spent (group *C*), dimishing in size and changing their color, until their appearance is the same as in the immature fish.

The method of recording was to tabulate each observation in its appropriate space on a prepared data sheet which was divided into sections for each classification in each sex.

The samples which were taken each day consisted of the first one hundred females with the accompanying number of males which we saw opened. If necessary, the samples comprised fish from several markets. The reader will of course question whether the samples were representative of the entire catch. It seems probable that if most of the fishermen make their catches in the same general localities fairly close to each other, as usually appears to be the case, daily samples consisting of the first several fish selected at random in the markets, might be a representative sample of the daily catch. Each day we asked the fishermen of as many boats as possible where their catches were made. In nearly all cases, the replies agreed with each other as to general location each day, and it would seem, provided the replies were truthful, that the boats are all inclined to fish together in about the same localities. Skogsberg, in recounting the shifting in places of capture of the barracuda[1] in 1922, obtained the same results as the writer[2] by questioning the fishermen, and this would seem to substantiate the reliability of the replies. There is, of course, the unavoidable danger of selection in the fishing, if, for example, the nets should gather only the fish in the top layer or only one edge of the schools; or perhaps in the sampling itself, if there should be a size selection by the market butchers, in which case sexual dimorphism might possibly detract from the significance of the data.

The barracuda fishery is carried on locally from April until September, and during the rest of the year the fishing occurs south of an extension of the international boundary line. Throughout the winter months we questioned the captains of the boats which brought up barracuda from the south, concerning the presence or absence of roe or milt in the fish. The earliest record of maturing fish which we have for 1928 is of March 22, when the *California II* landed a large load

[1] Skogsberg, Tage. Preliminary Investigation of the Purse Seine Industry of Southern California. Fish and Game Commission of California, Fish Bulletin No. 9, 1925, p. 34.

[2] Walford, L. A. Barracuda. Division of Fish and Game of California, Fish Bulletin No. 15, Pt. 9. 1929.

of cleaned fish, most of which had had roe or milt in them, according to the captain. On March 26, about a ton of barracuda was landed, only fifteen fish of which were not cleaned. These fifteen fish all seemed to be rather close to maturity. Beginning April 2, barracuda were brought in round (not cleaned), and from then on throughout the 1928 season, market observations were made daily or whenever

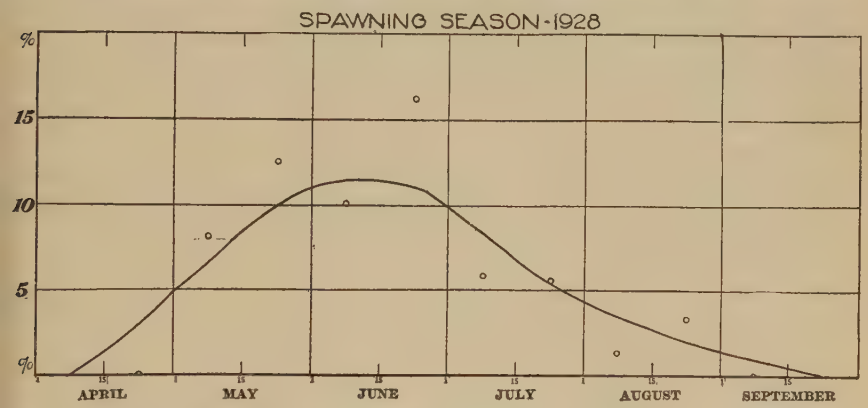

FIG. 33. Relation of the number of spawning females and the total number of females expressed in percentage. The observations are grouped in bi-weekly periods and represented by the small circles. The data are smoothed to show the general trend.

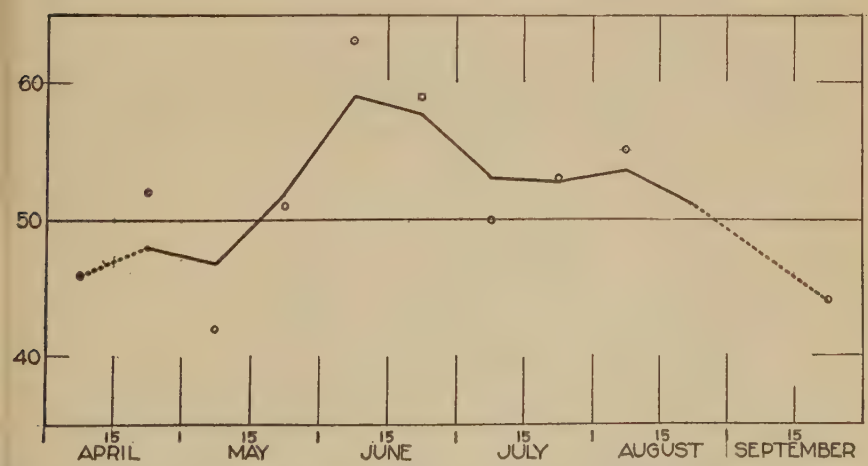

FIG. 34. Relation of the number of males to the total number of fish (1928) expressed in percentage. The observations are grouped in bi-weekly periods and represented by the small circles. The data are smoothed to show the general trend, which is represented by the heavy line.

fish were available. Figure 33 shows the relation between the number of spawning females and the total number of females expressed in percentage, by bi-weekly periods. The original figures, shown by the small circles, were smoothed to show the general trend of the season. The span of the season in 1928 was from between April 1 and 15 to between September 1 and 15. The height of the season occurred between May 15 and June 30.

An interesting and puzzling feature of the spawning season of the barracuda is that at no time of the year are all of the females spawning at once, according to our market observations. The relative number of spawning females changes from day to day, sometimes quite radically. The daily spawning season observations for 1927 are shown graphically in figure 35, in which the ratio of spawning females (group *c*) to all females is represented by the solid line. There is no apparent periodicity or regularity in the occurrence of the highest ordinates. After August 13, no more spawning females were observed.

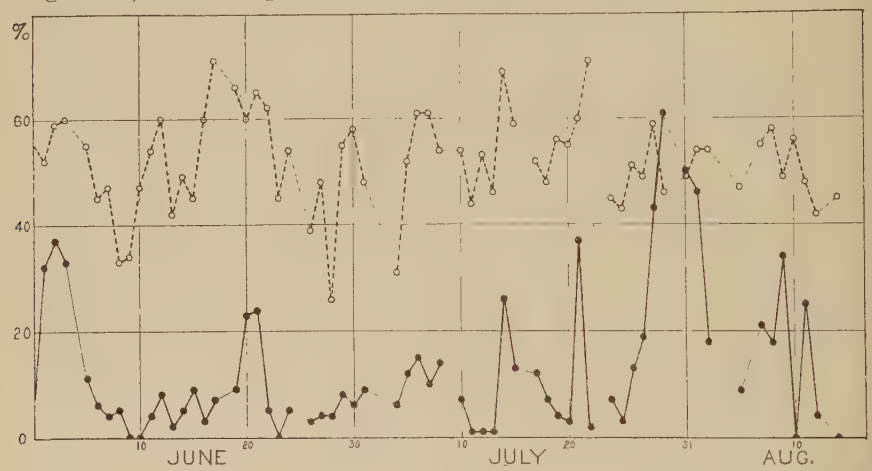

FIG. 35. Daily spawning season observations for 1927. The broken line represents the relation between the number of males and all fish, expressed in percentage. The solid line shows the relation between the number of spawning females and all females, expressed in percentage.

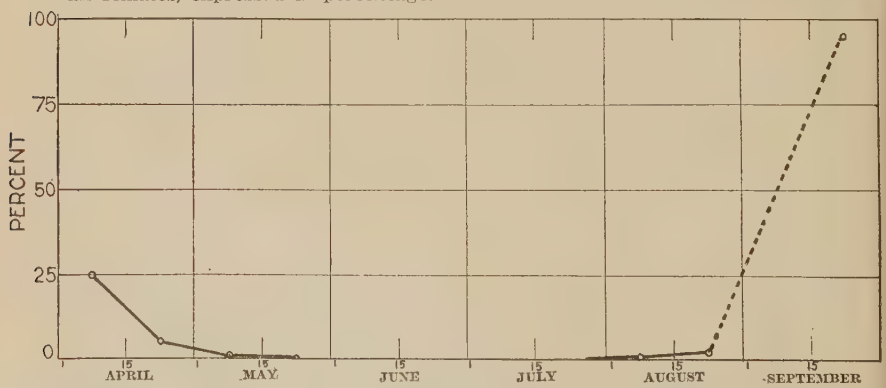

FIG. 36. The curve between April 1 and June 1 represents the relation between the immature females and all females expressed in percentage. The curve between July 15 and September 30 shows the relation between spent females and all females expressed in percentage.

In 1927, the first spent fish (group *d*) appeared in the markets on September 7 near the close of the spawning season. However, no samples had been taken since August 26, and it is possible that spent fish would have appeared sooner had fish been in the markets. In 1928, the first spent fish appeared in the markets August 13. Figure 36 shows the relation of immature females (group *a*) and spent females (group *d*) to all females in 1928. The fish classified as immature are

those which had not yet reached maturity that year, and occurred between the first part of the season and the last two weeks of May. Those classified as spent are those which apparently had already spawned that year. These appeared in the markets from about the first two weeks of August to the end of the season. It will be seen that in the beginning of the season only twenty-five per cent of the legal sized females were immature. After the first two weeks of May, no more immature fish (group *a*) were seen. In the latter part of July, the first spent fish (group *d*) appeared. Then the percentage of spent females rose rapidly, and by the time all of the females were spent the fish had apparently disappeared and the season was over.

The immature and spent stages of the males (groups *A* and *C*, respectively) occur during the same period as the corresponding stages in the females. If graphed, the relation of these stages to all males examined, as expressed by percentage would present a picture similar to figure 36. This fact is borne out in the following table:

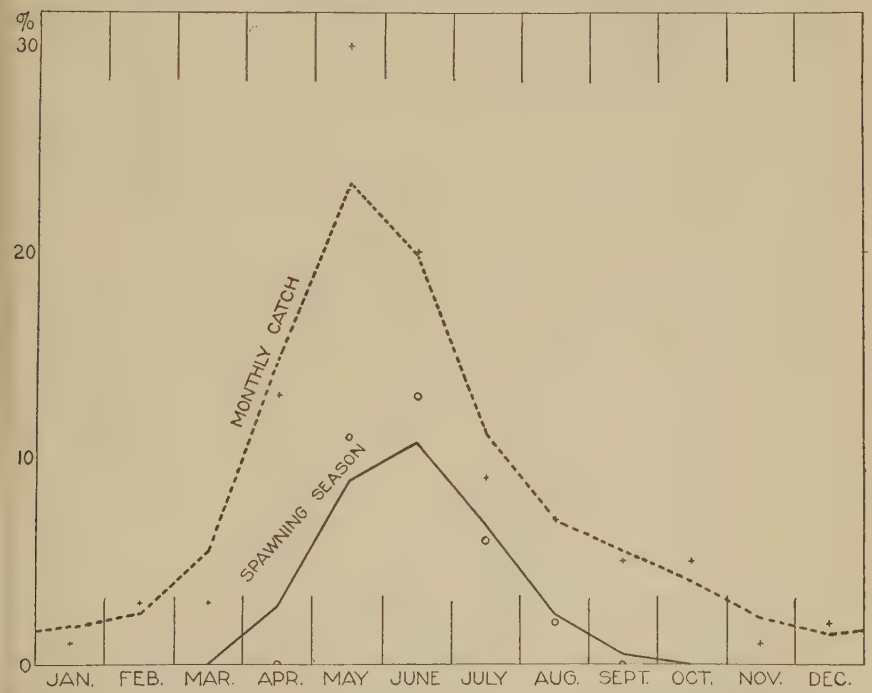

FIG. 37. Comparison between the monthly catch and the spawning season.

OCCURRENCE OF IMMATURE AND SPENT MALES

(The figures are percentages of the total number of males.)

Date	Immature males (Group *A*)	Spent males (Group *C*)
April 1–15	39	0
April 16–30	4	0
May 1–15	0	0
May 16–31	0	0
June 1–15	0	0
June 16–30	0	0
July 1–15	0	0
July 16–31	0	0
Aug. 1–15	0	1
Aug. 16–31	0	19
Sept. 1–15	no data	no data
Sept. 16–30	0	93

It is worthy of note that the barracuda fishing season is concurrent with the spawning season. Figure 37 compares the monthly catch of local fish delivered to Los Angeles and Orange counties, with the spawning season. The monthly catch is represented by the relation between the average monthly catch and the average yearly catch, expressed in percentage, averages being for the five-year period, 1923 to 1927. The spawning season is represented by the relation between the spawning females (group *c*) and all females, expressed in percentages. The spawning season observations are by monthly periods. The data were smoothed to show the general trends of the two curves. It will be noticed that the highest ordinates of both curves occur during the months of May and June, and that the rise and fall in the spawning season curve is reflected by a similar rise and fall in the monthly catch curve. Whether there is a causal relationship here, we shall not venture to say. The fact that no spent fish (group *a*) appear in the markets while the fish are spawning may be due to the fact that within the limits of the distribution of the barracuda, the regions where they are caught in greatest abundance becomes farther north as the season progresses.[3] It might possibly be that in their advance northward, the fishermen leave the spent fish behind, which in the meantime disappear. Toward the end of the spawning season, the fishery is carried on mostly in the regions of the northern limits of the distribution (Point Concepcion), and the total catch diminishes as the spawning season closes. The fish brought into the markets at this period are almost entirely spent—the laggards in the post-season disappearance.

An interesting point for consideration is the fact that the relation between the number of males and the total number of fish changes from day to day in much the same manner as does the number of spawning females. During the course of the whole season, the sex ratio hovers around unity, with a distinct tendency for the males to preponderate. In 1928, of 18,005 fish examined during the entire summer, 55 per cent were males. In 1927, of 16,530 fish, 52 per cent were males. In 1922, of 1806 fish examined, 55 per cent were males.[4] Of 9,000 young barracuda of the first year class, 49.5 per cent were males, or practically a unity ratio. This would lead us to believe that a preponderance of one sex is a later development, due possibly to a number of causes, among which are suggested differential mortality, spawning migrations, or different habits of the two sexes. Unequal sex ratios have been noticed in several other species of fish, sometimes with the males predominating as in the case of the true smelts,[5] though more frequently with the females predominating, as of the California sardines, *Sardina caerulea;* California jack smelt, *Atherinopsis californiensis;* grunion, *Leuresthes tenuis*[6]*;* or in the European plaice, *Pleuronectes platessa.*[7]

There is a strong tendency for the ratio of males and all fish to vary as the ratio of spawning females and all females. This is illustrated

[3] Walford. loc. cit.
[4] Skogsberg. loc. cit., p. 37.
[5] Kendall, William Converse. The Smelts. Bulletin, U. S. Bureau of Fisheries, Vol. XLII, 1926 (1927), p. 299.
[6] From the records of the California State Fisheries Laboratory.
[7] Hefford, A. A. The Proportionate Distribution of the Sexes of Plaice in the North Sea. Rapports et Procés-Verbaux, Conseil Permanent International pour l'Exploration de la Mer, Vol. XI. 1909, pp. 137–175.

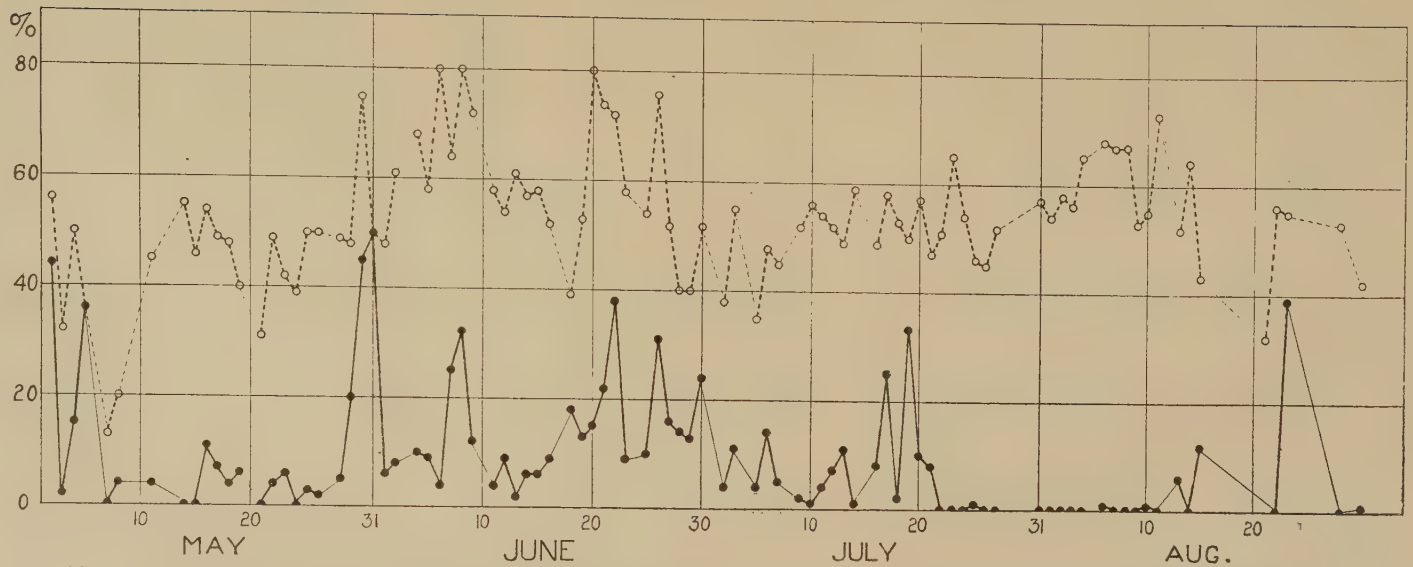

FIG. 38. Daily spawning season observations for 1928. The broken line represents the relation of the number of males to all fish. The solid line shows the relation of the number of spawning females to all females. Relations are expressed in percentage.

in figures 35 and 38, which graphically show the daily observations for 1927 and 1928, respectively. The broken lines represent the ratio of males to all fish, and the solid lines the ratio of spawning females to all females, expressed in percentage. In figure 34, the ratio of the males to all fish is represented, with the daily observations combined into bi-weekly periods for 1928. The tendency for a higher preponderance of males to occur while the spawning season is at its height is clearly suggested. If the data for the two seasons, 1927 and 1928, be combined, there is a coefficient of correlation (Pearson) between the ratio of spawning females to all females, and the ratio of males to all fish of $.304 \pm .047$. Since the coefficient is more than six times the probable error, we may consider it significant. If each variation in the curves be considered as unity, then the coefficient of correlation is $.394 \pm .049$. This is the "coefficient by concurrent deviations,"[8] and merely shows that there is a tendency for the two curves to vary in the same directions without regard to the amount of variation. What is the significance of this sex ratio? Perhaps there is a back and forth migration to the spawning beds, but this is a supposition which must be substantiated by further investigation.

Summary

According to market observations made:

1. The barracuda spawn between the first part of May and the middle of August, with the peak of the season occurring during the month of June.
2. No spent or immature fish are landed during the period from the last two weeks of May to about the first two weeks of August.
3. The ratio of the numbers of spawning females to all females fluctuates sharply throughout the season.
4. There is a strong tendency for the ratio of the number of males to the total number of fish to fluctuate in the same direction as the ratio of the number of spawning females to all females.

THE SPANISH CERCO REAL OR "ROYAL BLOCKADE NET"

An Ancient Sardine Gear.

By George Roger Chute.

Spain is at present experiencing a general rejuvenation and, as part of a broad scheme for renewing its ancient greatness, is seeking to better its utilization of one of its potentially most productive resources—the fisheries. It must be remembered that for several centuries Spain was the dominant naval power of the world. During that period maritime technology in all its branches was given the greatest forward impulse in all history. Merchant and military vessels, the art of ship rigging, new sail plans, knots, seamen's devices and shipboard appliances of all kinds were invented, many of these being known even yet—to the few sailing ship mariners that remain—by their genitive names of "Spanish bowline," "Spanish windlass," "Spanish reef," "Spanish burton," and many more. But though it is rather common knowledge that England became schooled in navies by what she learned from the

[8] King, W. I. The Elements of Statistical Method. New York, MacMillan. 1919, p. 207.

navies of Spain, it is not realized to what extent the world is beholden to the Land of Pelayo for such other marine improvements as, for example, our many forms of specialized fishing nets. The humble art of ensnaring a fish being looked upon as unchivalrous and lacking that glamor which surrounds the battle maneuvers of thundering armadas, we have heard much less of the great successes won by Spain's remarkable "Royal Blockade Net" than of the fiasco of her navy's debacle in the Canal de la Mancha.

In the September, 1928, number of the Boletín de Pescas, published by the Spanish Institute of Oceanography through the General Fisheries Director of the Ministry of Marine, Madrid, there appeared the second of a series of writings by Señor Fernando de Buen, Chief of the Department of Applied Biology of Fisheries, in which he devotes himself to a study of that enormous fishing apparatus—developed during the time of Spain's famous military conquests and naval successes—the *Cerco Real* or "Royal Blockade Net." This tremendous gear was a sardine apparatus, and because America is concerned in bettering the means at present employed in prosecuting fisheries for that species, attempts by Spain to reestablish the *Cerco Real*, and put it into use again, will be observed with keen interest in this country, as well as elsewhere throughout the world.

According to its description given by Señor Fernando de Buen, the *Cerco Real* was in reality nothing more than a haul-seine enormously enlarged. It was composed of a bunt or central section of small mesh and heavy twine flanked by two wings of larger mesh and lighter material. There seems to have been considerable graduation in both mesh and twine weight, the wings approximating the bunt itself in both of these particulars at their inner extremities, but gradually becoming quite dissimilar through having large meshes and light webbing towards the outer tips of the wings. The *Cerco Real* possessed one other feature in common with ordinary haul seines—its greatest depth was in the bunt; it gradually shoaled off towards the wing tips until the cork line and foot rope could be made fast to a towing bar, spreader, or "rooster's foot," as the Spanish called it. Long lines or warps were made fast to each of the two "rooster's feet," and with these the net was hauled in from far out at sea, and landed on the beach.

"The *Cerco Real* usually measured 900 to 1000 fathoms in length * * *" writes El Señor de Buen, "with a height varying between 18 and 24 fathoms, according to the point selected. It had a wing on both sides, each about 400 fathoms long. The central portion, more strong, of greater height, and called *cope* (bunt) was 100 to 125 fathoms in length.

"A vertical net, composed of innumerable pieces, it usually terminated at each end in a 'cock's foot' followed by 1,400 fathoms of line.

"In the *Cerco Real* the mesh of the wings measured an inch and a half to two inches, squared mesh,[2] and a half-inch in the *cope*.

"Corks were spaced along the head rope, leads not being affixed to the foot rope but stones and grapnels were used to keep the net distended when a pound was formed of it for the purpose of storing the

[1] Contribution No. 78 from the California State Fisheries Laboratory, January 16, 1929.

[2] "Squared mesh" or "bar mesh" is exactly one-half as long as "stretched mesh"—the measurement usually used today. The "squared mesh" dimension is the distance between any two adjacent knots in webbing.

captured sardines for awhile so that they might be marketed at the most advantageous time."

The authority quoted does not fix the date of the earliest use of the *Cerco Real* in Spain, but gives the impression that it might have been at the climax of its history around 1700, or perhaps earlier. Since those were the days of the great tradesmen's guilds, then universally powerful throughout nearly all of Europe, it is not remarkable that fishing, and particularly this type of fishing, should have come to be a guild activity. Indeed, because machine-made webbing was unknown in those medieval times, and all netting had to be hand-knit from hand-laid twines twisted from hand-spun threads, the difficulties in the way of fashioning a seine nearly a mile long can be imagined, and it may be that except for the powers of organization possessed by the Maritime Guild, and the stimulus which it gave to a concerted, cooperative effort, the *Cerco Real,* most mammoth of all hand-made fishing tools, would never have come into being.

The construction and operation of the *Cercos* took on the character of a community enterprise. Just as on the coast of Maine, and in Fundy's Bay, the men of an entire small settlement join forces in gathering materials and creating a common property in the form of a herring weir, or in Nova Scotia seaside towns business people unite in building and outfitting a sailing vessel to be officered and manned by the seamen and youths of the place, so the Spanish fisherfolk, organized under their trade union officers, pooled resources and labor to the creation of a *Cerco Real.* Tons of cork floats, miles of rope, thousands of square yards of various sized webbing, and weeks of labor by large crews of experienced rackmen or hangers were necessary to the completion of one of these nets. The blocks of web were hand-knit by the women and girls of the ports, the wives and children of navy men absent on duty enjoying certain preference in the apportionment of this labor. Each net had its complement of officers, who evaluated the contributions of webbing by the women, and the work done by the men employed in hanging and in fishing the gear, kept a careful written record of the interest of each member or contributor, and saw to it that the catch was divided and apportioned upon that basis.

But the wars of the seventeenth and eighteenth centuries wrought havoc with the Maritime Guilds and with the *Cerco Real* associations. Spain's reverses at sea had cost the lives of thousands of her best mariners and fishermen. The cessation of commerce and the sieges of blockading squadrons of enemy craft had gone far to destroy the once flourishing and productive sardine enterprise. Fernando de Buen quotes from the *Ordenanza* of 1750, which provided regulations for the fisheries of the inlet of Pontevedra and all of the ports thereon:

> "2nd. ITEM, that whereas formerly in this locality and estuary there were many *cercos* and *armaciones reales* for the fishing of sardines, which were caught in such abundance that the yearly product exceeded 80,000 ducats, because of continued wars, lack of trade, indolence of the people and other causes, said *cercos* were abandoned, and through their lack has come a decline to said locality and to other ports on the estuary because having no other maritime commerce than that which the fisheries provide. Special

care should be given to re-establish the *cercos,* for in addition to the great abundance of fish which is caught in them, and with less cost and fatigue, they admit, for their proper management, every sort of person, poor, rich, old people and youths, each one receiving his stipend or part from the fishery in proportion to his labor or to that extent in which he is interested in the net."

In 1768 the *Ordenanza* of the province of Pontevedra again refers to the desirability of renewing the *Cerco Real* activities, stating that none then existed. Indeed, the great "Royal Blockade Net" seems to have become entirely extinct excepting for a temporary revival of its use in the waters of Galicia. An organizer of ability and influence there succeeded in restoring the Fishermen's Guild, and a new blockade net actually was constructed and put into operation. The movement came to nothing, however, partly because of complaints raised by the priesthood of the port who were losers of tithes because of the operation of the big net, and partly because of quarrels and jealousies engendered between the fishermen themselves by reason of the revival of some of the ancient prerogatives of the *cerco,* which gave to it exclusive rights in certain waters, and forbade all other gears to encroach upon them. The movement presently was given over, and with the retiring of this net from the fishery, the last *Cerco Real* seems to have passed into history. There are none in existence today, says our authority.

With respect to the organization of the *gremios* or guilds, El Señor Fernando de Buen states that each association named by common agreement two managers or *aviadores,* two measurers or *carteleyros,* one shore captain or *maestre,* and one boatswain or *poltreyo.* Tenure was for one year, and service obligatory; refusal to accept office was punishable by severe fines except in instances where exceptionally good reasons were given.

The two *aviadores* were the actual managers of the enterprise. They made decisions concerning when the fishing should be done, they maintained contact with the priesthood and royal authorities, and they were the court for levying fines against members convicted of shortcomings by common consent, and for adjudicating differences arising within the organization. Their assistants were the two *carteleyros* or measurers whose duty it was to divide the fish caught, set aside a proper proportion of the catch for the support of the organization and the maintenance and repair of the gear and boats used, and evaluate contributions of labor and webbing from the members. The *maestre* was the captain of the largest boat or *galeón* used in setting the net, and the *poltreyo* was his officer or assistant, in charge of the crew carried aboard. Each of these ships' officers was a picked expert, and received a double lay or share.

Several boats were necessary to the successful prosecution of the *Cerco Real* enterprise. Usually there were two light and swift sailing boats that acted as scouts, tacking to and fro across the waters reserved to the use of their particular net, looking for fish. When schooling sardines were sighted agreed signals brought the big gear out from shore. The *cerco* was often carried on two large barges called *galeones,* these having neither mast nor sails but propelled by oars in the hands of 22 or 24 fishermen. The net was paid out to seaward of the fish, and

the long warps taken in to the shore, where they were received by the whole assemblage of persons interested, and hauled in.[3]

Sometimes the bunt was taken up on the beach, and the catch distributed at once, but it often occurred that the tonnage captured was so great as to make immediate disposal of so enormous a quantity impossible. When this situation arose it was the practice to moor the bunt of the net in the sea,[4] where it was allowed to remain until the fish could be removed from it gradually, and cured.

Describing the *Cerco Real* fishery, and the laws under which it existed, El Señor Fernando de Buen quotes from the *Ordenanza* of 1750 (Province of Pontevedra) parts of which are here given liberal translation. The closed seasons, fines, forfeiture of gear, and restrictions governing the use of destructive apparatus of capture, set forth in these ancient laws of Spain—now almost three centuries old—should be significant and pertinent to present day problems of fishery regulation. They disclose it a historic principle, now long established, that a national resource should not be plundered to the enrichment of a few, and that the constant contest between private rapacity and the public good is as old as is the common ownership conception of resources. This early interest of ancient Spain in the preservation of her sardine fishery should afford the comfortable sensation of three centuries of precedent to modern exponents of reasonable marine husbandry and fisheries conservation.

La Ordenanza de la provincia de Pontevedra for 1750 reads, in part:

FIRSTLY, all of the seafaring men of said estuary and its ports are charged to employ the greatest of care in dedicating themselves to the catching of all sorts of fishes, and to curing and salting them for the provisioning of the dominions of this crown and for foreign commerce, because of the great interest that the royal exchequer has in the fishery, a utility which results in a common profit and betterment to the ports.

3rdly. ITEM, that if any of the ports of the estuary, for lack of means or of a sufficient number of people for the *cerco* are unable to establish it, the seamen of that port still wishing to engage in this business, it shall be obligatory that they be admitted to the work of the other *cercos* which may be in the other ports, the Admiralty Judge who shall be in the port at the time apportioning and distributing them with discretion and prudence, so that all may have an interest in the fishery which God may grant.

4thly. ITEM, that the *cercos* which shall be made or fabricated in the ports of this estuary shall not be permitted to be repaired or overhauled on shore before the sixteenth of August of each year, nor go to sea until after St. Bartholomew Day, since up to that time it is not considered that sardines are found sufficiently matured to warrant their capture with *cercos*.

5thly. ITEM, that the *cercos* of this community shall not go out to sea of a Monday without the men having first heard mass, which is celebrated for the faithful dead in the parochial church of *Santa María la Mayor*, and he who is missing from said mass shall pay a fine of fifty *maravedís*. But this shall be understood to mean only when the tides permit it, since as this village is a half league from the bar and at low water it is impossible to go out, the penalty shall not be imposed when it is necessary to take advantage of the tide.

6thly. ITEM, that the *cercos* shall return to their ports every Saturday before noon, and when one of the vicars of the Holy Body shall make a signal or raise a pennant or small flag, according to the ancient custom, the *cerco* which may remain in the sea and shall have its net outspread of a Saturday afternoon, shall forfeit

[3] The immense sweep of the seine as it approached the land in crescent form perhaps gave rise to the name applied to it—*Cerco Real*. The term is a naval one, and signifies the royal blockade of an enemy port by an encircling squadron of men-of-war.

[4] The net was prevented from being cast ashore by the surf by bending numerous lines to the head rope, these lines being run seaward and made fast to kedges, large stones, or other weights suitable for moorings.

he fish caught, which shall be divided among the *cercos* which have withdrawn nd were obedient.

7thly. ITEM, that the *cerco* fishery must last only from the other day of St. Bartholomew to the end of the month of December; but since along this coast in ome years it has been experienced that the principle and most abundant harvest f sardines is in the month of January, if this should happen, with permission of he Admiralty Judge who shall be in authority at the time, it shall be allowed to rolong the *cerco* fishing until the twentieth day of said month of January.

8thly. ITEM, that there being two or more *cercos* in the ports of the estuary, verything possible shall be done that between them there be union and cooperation, nd thereby evade all sorts of altercations and dissensions, from which only inevitble losses result, and because of which the people do not dedicate themselves to he fishery with the application and industry which makes for the good of all.

9thly. ITEM, that should it be impossible to coordinate said *cercos*, so that here be observed among them the necessary equality, no *cercos* may go out to sea ntil after the one from the vicinity of this village shall succeed in passing over the ar, since through lack of water and tide it is not possible to go out or float at all ours, which obstacle is not experienced by the other ports; but as soon as said *erco of* Pontevedra is discerned afloat outside the bar, and the other ports are dvised of it, they also may then go out immediately with their *cercos* to the sea, nd cast them where they may consider best.

10. ITEM, that the fish scouts who first sight sardines and signal for the net arge, shall be privileged before all others to set their net, and until it is all paid ut and closed no other crew shall set its *cerco* in that locality, on penalty of 10,000 *aravedís* fine and indemnity for all of the damages and injuries to those who first ame and set their net; but although the scouts shall have signalled for their net arge, if it arrives and tosses its oars or they order it to stop because the sardines ave disappeared, in that case the call signal has no more effect, and the scouts f the other *cercos* are at liberty, seeing the sardines, to signal to their own barges nd set their own nets under the same privileges as in the first place.

11. ITEM, that if any boat or *jeito* or fishing vessel of whatever other sort hich does not belong to the outfit of any of the *cercos* shall signal or give notice o any *cerco* to cast its net, it shall be denied to do so until the scouts shall have one to identify the fish and make the signal; and such boat, for having meddled what is none of its business and for having done a thing that might occasion rouble and quarreling, shall pay a fine of 500 *maravedís*.

12. ITEM, that if there be many *cercos* in the estuary, and only two or three f them associate together, if the scouts of one of them, when they shall have gone o sea, shall espy sardines, and if their barge does not arrive, and they see one elonging to another *cerco* with which they are in partnership, they may signal to heir associate barge and set its net without incurring punishment; but if after the et is set still more sardines are sighted, and if their barge arrives and they signal o it or to another associate to set behind the first net cast, second luck, this signal hall not have the effect of granting exclusive rights, and if any other *cerco* which nds itself close at hand should arrive first, it may set its net without incurring enalty.

13. ITEM, that there shall be no *cerco* in all of this estuary which is not as eep as the water and fifty seams[4] to the side, with forty *copes* in all, each seam eing 85 meshes, and the *cope* of as many more, according to the pattern master who esigns them for this Kingdom.

14. ITEM, it is declared that the locations or proper places for setting the *cerco* this estuary are ten: two in the island of Tambo, one of them on the side wards the sea and named *La Nespera*, and the other inside on the estuary and lled *El Boy;* another place known as *Area de Barca;* another in *Rajo;* another *Porto-Celo;* another in *San Jorge de Mogor;* another in The Cave Between the wo Mountains, in *Goyra;* two on the long beach of *Bueu y Beluzo;* and another *Arca de Menduina*, in *Aldan*.

15. ITEM, that from the day of San Roque, when the period begins in which e net of the *cerco* may be taken into the open to condition it, until the entire onth of December has passed, no vessel, either by day or by night, shall go to h *jeito* from the river *Misierio*, which is in *Samiera*, in a straight line from the

[4] The Spanish apparently used the word *veta* to mean not exactly a "seam," but a idth of webbing.

rock of *Batel*, which is situated to one side of *Marín*, towards the bar. But from said localities to the edge of the sea it shall be allowed to fish *jeito* during said time, never by day, but only from sunset until sunrise on the day following, penalty of 500 *maravedís* to him who shall do the contrary, and in addition to that the nets with which he is found fishing shall be confiscated, although it be night, if he be within prohibited limits; and they shall take him, that the Admiralty Judge may mete out his punishment.

16. ITEM, that neither by night nor by day, in no part of the estuary, shall it be permitted to fish for *jeito*, dragging the net across the bottom, because of the great injury which results, except only to six fathoms from *Sineira*, in each pair of trawl boats, and he who shall do the contrary shall have his nets confiscated and pay 1,000 *maravedís* of fine.

CALIFORNIA FISH AND GAME

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June 14, 1929

"If we want fish we have to reserve some place for them to live."—Herbert Hoover.

FOURTH ANNUAL CONVENTION OF EMPLOYEES

Coming from all parts of the state, wardens and officials of the Division of Fish and Game gathered in San Francisco for a three-day convention on February 13, 14 and 15, 1929. The first morning was devoted to registration and conferences at the headquarters office, 510 Russ Building, San Francisco. An interesting pathological exhibit was on display and a special exhibit of books was arranged in the library.

The opening session was held in the Italian Room, Whitcomb Hotel, at 1.30 in the afternoon. Executive officer, Eugene D. Bennett, presided. First on the program were addresses by President Zellerbach and Commissioner R. G. Fernald. Mr. Fred G. Stevenot, director of the Department of Natural Resources, then explained certain relationships between the various divisions of the department. Other speakers included E. L. Macaulay, chief of patrol; John Spencer, in charge of Bureau of Hydraulics, and Mr. George Tonkin, federal game warden. Special features of the program were short talks by Senator Sanborn Young, chairman of the Senate, Committee on Fish and Game and Assemblyman Hubert Scudder, chairman of the Assembly Committee on Fish and Game.

An evening session was devoted to motion pictures. The Bureau of Education and Research presented some of the standard films used in educational work and also displayed for the first time several new reels which had just been completed. Of particular interest was one

FIG. 39. Fish and game commissioners hold meeting after the barbecue at Yountville Game Farm, February 15, 1929. From left to right, Commissioner George Clarkson, Executive Officer Eugene D. Bennett, Commissioner Reginald Fernald, President I. Zellerbach. Photograph by E. S. Cheney.

which portrayed the spiny lobster and the Pismo clam industries.

The session on Thursday morning began with an instructive address by Captain Sweet of the United States Army, who is training the San Francisco police department on the use of side arms. S. B. Show, district forester, and P. Paul Piage, Eugene D. Bennett. The last hour of the session was devoted to discussion from the floor and a presentation of proposed legislation.

A special effort was made this year to avoid the usual banquet and apparently a worthwhile substitute was discovered. Friday, February 15, was devoted

Fig. 40. On the firing line during the pistol shoot held at the State Game Farm, Yountville, February 15, 1929. Photograph by E. S. Cheney.

president of the Associated Sportsmen's Clubs of California, discussed cooperation with their organizations. The work of the volunteer deputy was described by Walter Welch; publicity was discussed by F. B. Anderson and first aid by C. E. Dickinson, safety engineer of the Pacific Gas and Electric Corporation. Dr. K. F. Meyer gave an interesting address illustrated with lantern slides on the subject of "Certain Aspects of the Diseases of Fish and Game."

The afternoon session was devoted to talks by various department heads: Game Refuges and Game Census, by J. S. Hunter; Fishing Conditions in Lake Tahoe, by W. H. Shebley; The Commercial Fisheries, by W. L. Scofield; Conservation Fundamentals, by Dr. H. C. Bryant; Expense Accounts and Finance, by H. R. Dunbar, and The Library, by Bessie W. Kibbe. An interesting presentation on evidence in game cases was made by

to the pistol shoot, a barbecue, and inspection of the State Game Farm at Yountville. The men were taken to the Yountville Game Farm by means of large busses. A series of ten targets had been arranged. All entered the pistol shoot for the Zellerbach trophy with zeal. The first round ended with a tie at 96 points for Taylor London, J. H. Gyger and Major John Farley. In shooting off the tie Taylor London outdistanced his competitors, raising his score to 97. All agreed that the winner of last year's shoot was again the surest and steadiest shot of the entire force. At the 25-yard range he placed all five bullets within a two-inch area in the center of the bullseye. After the excellent barbecue, which consisted of shrimp salad, barbecued beef and beans, formal presentation of the trophy was made to Deputy London with second and third prizes going to Gyger and Farley. An interesting display of

ay and river gear and fishing nets was ıade by Captain Sellmer.

The day afield proved to be a fine get-ogether for the men and the demand for similar occasion another year will be reat. After inspection of the game farm, ıost of the men started for home.

Nothing has improved the *esprit de orps* of the organization as much as have hese meetings. Furthermore, the pro-rams which have been of purely an edu-ational nature have assisted greatly in itting the men for greater service to the tate.

CONVENTION ADDRESSES

ourth Annual Convention Employees Division Fish and Game, San Francisco February, 13-15, 1929.

ADDRESS OF I. ZELLERBACH, PRESIDENT CALIFORNIA FISH AND GAME COMMISSION

In offering the members of our official amily a welcome to this, our fourth con-ention, which each year brings us all Until we held these conventions three years ago, you boys had not the pleasure of getting together and exchanging your views, finding out what was happening in the various districts, and what the Commission was really trying to bring about. As each year passes and we hold these conventions, we learn to be more considerate of each other, and to cooperate together in thinking out the conservation problems that we are trying to solve. The efforts that you boys have made to cooperate with the officials of the commission, have brought about the respect of your community and the sportsmen of the state, so that I think I can safely say there is no department of the state government that is thought more of today than the Division of Fish and Game, or one that has the confidence and respect of the public to a greater extent. That is due to the whole-hearted cooperation we are receiving at your hands.

If we are to succeed, we must succeed as one large business family. As I told you before, and I am repeating it now,

FIG 41. Examining the targets during the pistol shoot, Yountville Game Farm. The man at extreme right is Patrol Chief E. L. Macauley.

loser together in the work that we are ll engaged in, I want to tell you how appy the commissioners are, at the coop-ration and the fine spirit that exists oday in the personnel of our department. we are operating a large business, a department of the State of California, and that business is the conserving of the wild life of our state. You boys, who are all outdoor men, are responsible for

the success or failure of this division. As I have often said, you are really dedicating your lives to the work, not for the monetary returns you get—as the salaries you receive can not be the motive, for in any other line of business you would probably be getting two or three times what you do—but because you love the work. Unfortunately, in public life we have not the means to always pay the salaries the positions warrant. I want to say that with the increased licenses, the Commissioners and officials in the department are always looking toward trying where we can to increase the salaries that you are getting, and if some of you don't get your salaries increased as fast as you think you ought, I don't want you to feel it is an oversight; we are doing the best we can. Progress is slow, is bound to be slow, but we are making progress, and each year shows us further along in the work that we are doing.

I want to just say a word regarding the transfer of some of our deputies from one position to another. I want you all to understand and to feel that the order that was issued at that time was not meant as any condemnation of the work that you were doing in your district, but we made the transfers for what we thought was the good of the service, and when an order of that kind is issued I want you all to understand it is done after a great deal of thought, and there is nothing personal about it at all. As good soldiers, be each and everyone of you ready to cooperate and take your part of the burden, because it is just as hard for the head of the division to turn down a request that you ask as it is for you to ask it, and I want you to feel that the commissioners and the executive officer are trying to make your work as light as possible and your job as pleasant as possible.

I want to say that for myself, and I can speak for the commissioners, the pleasure that we get out of the job we are trying to do is found in the association we have with you boys in the work, and also in the fine cooperation we have from the sportsmen of the State of California. We have their respect now and you boys have their respect, and not alone do we have that, but the work of the commission has the respect of the people of the community and of the State of California. In fact, we are looked upon with respect today all over the United States for the character of the work we are carrying on. One reason is that we are trying to eliminate any political influence in the operation of the commission. Conservation can not be carried on unless we act as we are acting now, as one large business family, trying to build our organization on a sound foundation, always with the strict idea of cooperating with each other and thinking of just one thing—conserving the wild life of the State of California. That is our one thought.

We are not anxious to prosecute anybody. We are not anxious, as you know, to have technical arrests made, but we are anxious to prosecute wilful violations of the law, and we desire the respect and confidence of the judges and peace officers of the state, so we can make violation of the law a serious offense, and I am sure you will agree with me, we have accomplished that.

I know this meeting will bring about a great deal of good. I trust when you go home you will carry new thoughts that will build up our work, that will bring more progress, so each year we will have more cooperation and better results than we have in the past.

Address of Eugene D. Bennett, Executive Officer

When one travels the length and breadth of this great state, back and forth across it, over the mountains and valleys, and sees the myriads of strange situations and possibilities that exist in almost countless numbers, it is both an inspiration and awe inspiring.

I did not realize, had no comprehension of what we had here, and if I told you a year ago that I thought I was facing a big job that I was ill-prepared to take, I feel that today it is even bigger.

It is said of a great Greek philosopher, probably the father of philosophy, Socrates, in the evenings when he would gather the youths around him and give his long dissertations on the new school of thought, questions would be asked and inquiries made. "Socrates, tell us the philosophy of this or that, what should be done. You know and we don't, we are seeking knowledge." Socrates said: "Gentlemen, I don't know what I know. There is only one thing I am sure I do know, and that is that I know nothing." In other words, that great thinker realized in his humble way he knew little indeed, and he called it nothing. For any man to take this position I have had and become its master, he is either an imbecile or an ass. I don't think the oldest one of you deputies, while you may have been deputies for years and know all about it, really down deep in your hearts will deny that there is a great deal left for you to learn.

Recently I was reading a book on merican government, in which a profes- r of the university stated that con- rvation was unknown twenty-five or irty years ago, it was really an un- iown thing. We gave no thought to e conservation of the forests, saving of e wild life of the forests and streams; it as time has gone on, with the in- ease in population and all the other tendant circumstances and consequences, e realize this is a great field and a ecessity, and that we are still learning. I attended a convention of fish and me commissioners at Seattle, in com- ny with Mr. Zellerbach and a number the other bureau chiefs, members of ir division, and we had congregated ere the leaders of the conservation ovement in the whole United States, en who have national reputations in e science and art of fish culture, men io are in touch with the best examples game management. The thing that pressed me most was the fact that ose men were all frank and honest, d admitted that there was a great al more they did not know. We are st pioneering in this science and art of nservation.

Personally I don't pretend to be a sci- tist because I realize my limitations. am not going to divorce myself from ings I can do fairly well for things I am t fitted for. It is very essential that e scientific part of the work be exe- ted with the very best thought that n be given it. I realize I have to de- nd on the men to run their end of it; have to depend on the head of fish lture to handle that department; leave to Dr. Bryant to run his, Mr. Scofield run the commercial fisheries. There e unquestionably a number of people t in the field who can tell you all out quail propagation and quail resto- tion; men who possibly know more out the science and art of fish culture an Mr. Shebley or Captain Lambson d the various hatchery foremen. Per- ps the scientists are right with some their conjectures where our men are ong; but it is my duty, and it is the y way I have of carrying out the will the director, to place a great deal of ponsibility upon these men, nearly all the responsibility, and simply see that it responsibility is properly executed. herwise you would have a one man mmission, running around like a top, ting nowhere. That is why I have d during the past year that the re- nsibility comes under the head of those ious bureaus. Only in that way is it sible to carry out this work.

I want to say further than what Mr. Stevenot has said, before things come to me, complaints and requests, they ought to first go to your immediate superior. Perhaps I have too much of the army idea, but there is a reason for that. In the army, a private would not go up to the captain unless he first spoke to the sergeant. They do not go to the head in some dispute. We are not running an army here, but the same system that prevails in the army prevails in Mr. Zellerbach's great corporation, and prevails here. There should be that element of responsibility passing all the way up the line and down again.

This morning I had a meeting with the captains of patrol. I endeavored as best I could to impress upon them the responsibility that we are placing directly upon their shoulders. They have done good work, and we believe they are going to do better work; but after all, Mr. Deputy, wherever you are stationed, we are looking first to your captain for the immediate proper functioning of his district. When you receive orders from your captain, it is an order from the executive officer, the commissioners, the director and the Governor. Perhaps you have had some one who has resented arrest, say, "You have no right to arrest me." That man possibly resented the fact that you, because your work was making arrests, yourself clothed with a little authority, dared to stop him and tell him he was under arrest. That individual was perhaps like one of us who might take pique from some order of a superior officer. You are not speaking to him as an individual, but with the majesty of the law, when you make an arrest. You are representing the sovereignty of the people of the State of California.

If you receive instructions from your captain or your executive officer, don't allow any personal feeling to enter into it. You are not taking instructions from John Doe, the individual, you are simply obeying the mandate of the sovereignty you serve. Unless a man can enter into that spirit, he is not fit to hold a position in any organization of this kind. Unless his mind is in the proper mental attitude to accept the spirit of the thing, and not the little personalities and other things that enter into those situations that have no place there, he cannot properly perform his duty. If you are spending all of your time worrying about what your captain is going to do, or what the chief of patrol is going to do or fail to do, you are not going to have any time to discharge your own duties down there in your little "bailiwick." Don't waste

your energy and your time, making your life miserable and unhappy, worrying about what the captain or somebody ahead, is going to do. That man has enough responsibility. As the responsibility goes up, difficulties increase. Keep your mind on your own ship. If you don't like the man who is placed ahead of you, forget it. Don't let your mind dwell on it. If he gives you an order, obey it. Try to do it the best you can, as willingly as possible. Try to place out of your mind these prejudices; but if you can't do that, and you seem obsessed with that spirit of ill will, forget it. If he has given you the order, and you have carried it out, consider the individual nonexistent. Consider you have received an order from higher authority that must be obeyed. Then of course, if the time does come when an injustice is done, some fraud or slight committed, you can come to me; but come to me through your Captain if possible, so we shall have no breaking down of the bars of discipline or morale. Don't be entirely discouraged when you have placed your case before the court of last resort, if you don't secure the results you think you should. We construct a magnificent temple of justice. We have a system of jurisprudence that is the heredity of the ages, and yet even today, with the splendid system of laws and administration the best that human mind can devise, we have here and there some case where justice may not land as it should. It is like the laws of nature, where sometimes the innocent and weak are crushed. These things must inevitably happen. More than likely, if you think it is wrong, it is just a case of personal viewpoint. I know perfectly well the commission does not want to do a thing that is unfair. The thing that is uppermost in their minds is what will accomplish the best results, what will render the best returns in this community that we are possibly able to give.

I can assure you where any action has been taken, where any move has been made, that would cause some personal inconvenience, some personal injury, that it does not lightly rest upon the shoulders of the commission. They have not forgotten the injury it may temporarily cause, but it is done with a sense of duty and responsibility to do their best.

The lives of every one of us are reaching out first in one direction, then we come to cross-roads and it branches out. One road seems lined with shade trees, it is a pleasant way to go, it is warm and yet the sun does not scorch too hot; places to sit down and rest along the way; no hills to climb—an inviting way to travel, a tempting way. How often we are tempted to follow that easy course. But the other road, is hard and difficult, full of uncertainties and hardships, yet we know that at the end there lies success.

It is just the same with public officials administering a trust, the easy way would be to follow that road of least resistance. As human beings, we all like to to be considered good fellows. I confess I should like to have every one of you throw your arms around my neck and tell me that I am the finest fellow in the world. I know half of you would not do it because you don't believe it. Just the same, I would rather have you think I am honest, a man who is true to my trust, and trying to do the right and honest and decent thing to the state I serve. That, gentlemen, is the spirit that should administer this division. It is the spirit I have endeavored to use during the past year. I only hope that whoever will continue in the years to come in trying in their humble way to head this commission, will continue likewise. In your own little district, your work is cut out for you, do it as well as you can, so that you can go home at night with a feeling of the utmost confidence and satisfaction, where you can say: "I have done my best, I can sleep soundly at night and feel satisfied when I awake in the morning." That is the greatest satisfaction a person can have out of life.

While from time to time things will happen to you in your official relationship, things you will not like, try to take them philosophically. We each have our separate sphere of work cut out. Try to help push the load instead of pulling it apart and adding weight to the burden. Try to do the very best that is in you.

There is nothing else I want to say to you today. You all know from our publications what our probable course is in the year to follow. We have a great deal of improvement to make. I feel we have made progress in this last year, but we have a lot more to make yet. We have a long way to go yet. We have to study and plan. I only trust that tomorrow and the following day will add to the knowledge and capacities of each and every one of us, so we can tackle this coming year's work better qualified, and I hope above all things else, with a better spirit.

Address of Senator Sanborn Young, Chairman Senate Committee on Fish and Game.

My interest in your work is so great, I feel every man here is my friend. It is a great privilege for a legislator to come here and meet and know men whose duty and responsibility it is to carry out the laws that we enact. I only wish every member of the legislature could have the benefit of the council and advice of you men that enforce the law, because no law is any stronger than its enforcement.

As I look back over the four years in which I have served on the Fish and Game Committee, I see great changes in the morale of the people of the State of California as regards conservation. If you will look at the upwards of 1800 bills before the legislature, 117 of which are fish and game bills, you will see that conservation is one of the outstanding fundamental factors in our bills and in the proposed laws. You will find bills dealing with the conservation of forests, conservation of water, conservation of wild life, conservation of natural resources, conservation of our men and women, conservation of our children, and you will realize that we have gone very far in the past four years toward conservation and restoration of our wild life, and I am very glad to be able to pay a tribute, and give a very great deal of credit to our Governor for the attitude he has taken toward our Fish and Game Commission and these men who have fought such a good battle, and who have done so much toward bringing us closer and closer to our ideals.

I do not mean we have not some very serious problems to face. We have some vicious bills. We have some bad proposed laws. I personally, will never rest and feel satisfied until certain conditions can be corrected. More and more we are reaching the point where the people of California are becoming awakened and aroused to this fact—that we do not own the wild life of the state to destroy, but to hold it only as trustees to pass on our own undestroyed, to those who shall come on after us.

Address of Assemblyman Hubert Scudder, Chairman Assembly Committee on Fish and Game

The furthest thought removed from my mind was that I would have to appear before any gathering and talk. I appreciate very much the fact, though, that I am here and have the pleasure of meeting with you.

I realize the responsibility which Senator Young and I have assumed in endeavoring to work over these bills and trying to arrive at a proper conclusion as to their meaning and their fitness to be made into laws. The action of the committee chairman is very largely to advise the committees, because almost everyone on the committee is the chairman of some other committee, and it evolves upon them to familiarize themselves with the laws so they can pass on first hand information to the members of that committee. The committee might not always approve of the deductions the chairman makes, but nevertheless you have to assume the responsibility of telling them your idea of the bills that have been presented. If it is right, it is right. If wrong, you are wrong, and you get the blame generally.

I have felt the responsibility to such an extent that I wish to go into the matter of commercial fisheries, to meet with the Fish and Game Commission to get their angle on the different bills proposed, and the last few days have been very enjoyable to me, I assure you. I never knew so many fish swam the waters of the ocean as I saw in Monterey Bay. I believe the people generally do not realize the bigness of the fish and game industry in the State of California.

The thought that you men, the policemen of our forests, rivers and fields, can enforce the law with such a small number of deputies in the field, is almost incredible to me. I believe as time goes on your numbers should be developed in order to get any proper results from the laws we pass. I am very keen to see, or to be a part in trying to pass laws which can be enforced, and not laws which would make you run behind a tree when you saw a violation of that law.

I believe only those laws necessary should be made, and then those laws enforced as well as your man power can do it. I believe that by following out that plan and trying to put down laws that can be enforced, and as nearly as possible laws that are popular, that the people must realize the importance of conservation and the protection of our wild life, because we have to make our changes today and tomorrow in order to provide for the years to come. I heard a very large packer state this noon, that our salmon had been depleted through an extravagant waste that had been going on for years, and unless we take some means

to remove the waste that is always being inflicted upon our other fishes of the state, we will soon have a condition similar to that of the salmon industry.

Our game is being taken care of as best we can, and you gentlemen have upon your shoulders the enforcement of game laws. I am looking for advice and information regarding the legislation before us, and I would appreciate it, as we have bills come in from every district in the state, and you gentlemen represent different districts, if we could get your personal angle on some of the bills that affect the very districts you patrol, it would be a great help to the committee, and I trust and hope we will receive some letters and advice from you, or through the commission. If there are any personal angles that might come to your attention, I know Senator Young would appreciate it, and I assure you we would be glad to receive any angle upon propositions that affect your particular district.

NEW ADMINISTRATIVE OFFICERS

Two new men have been added to the headquarters staff. The new officials are John L. Farley, who became executive officer after the resignation of Eugene D. Bennett on April 1; and Edward L. Macaulay, newly appointed chief of patrol. Macaulay takes the place vacated by J. S. Hunter who was named as an assistant to the executive officer over a year ago. The work has been handled more recently in a highly creditable fashion by K. P. Allred as acting chief.

Mr. Bennett accepted an attractive offer in connection with his chosen profession of law. Though relinquishing the position of executive officer, he does not leave the service, for he will be retained as attorney for the division. Thus, he will be able to continue the utilization of his knowledge of conservation matters and serve the cause in which he is so much interested.

Mr. Farley, first named as assistant to the executive officer and now filling Mr. Bennett's position, comes to the Division of Fish and Game with excellent training as an executive. After his graduation from the State Teachers' College in Wisconsin, he was principal of a high school. Following this work he returned to the University of Wisconsin, where he graduated from the college of engineering. After following this calling for some time he enlisted in the army at the outbreak of the war, and remained there when hostilities ended. Six years ago he resigned, then holding a commission in the Coast Artillery. He has traveled extensively throughout the east and middle west and has lived in Virginia, Georgia, Hawaii and California. He is a native of Ohio. Since leaving the army, Mr. Farley has been actively engaged in the practice of his profession of engineering, having been connected with one of the large public utilities of the state. He has been active in the California National Guard and holds the rank of major in that organization. Mr. Farley likes to hunt and fish and is thoroughly interested in the conservation of natural resources.

E. L. Macaulay has resided in California for twenty-five years. For the past five years he has been connected with the office of the State Adjutant-General, in charge of the armory at San Francisco. At the start of the World War he enlisted and commanded a battery of the 67th Coast Artillery in France during the conflict. He left the service with an excellent record, and now holds the rank of captain in the National Guard. Macaulay is a member of the Sierra and the Alpine clubs, being greatly interested in all sorts of outdoor sports, not the least of which is angling. Due to his experience in handling men and his record for close attention to detail, Macaulay should make a fine chief of the field forces of the Division of Fish and Game.

FISH AND GAME DISTRICTS

It is interesting to find that an eastern state has discovered that conditions vary so greatly that fish and game laws can not be uniformly applied. According to reports, the Conservation Commission of Michigan will go before the legislature with a proposed law to divide the state into three zones with separate fish and game regulations for each zone. It will be necessary to repeal 140 laws now in the statute books in order to make the change.

California realized before 1902 that conditions in the different parts of the state required different laws. A constitutional provision was adopted in 1902 allowing the legislature to divide the state into fish and game districts and to enact legislation appropriate for each district. It was not until 1911 that this constitutional provision was taken advantage of by the legislature.

Periodically, there are those who demand uniformity of laws throughout the state. These have been but minor protests, for most hunters and fishermen are convinced that some flexibility in the law is a great advantage. As has been

pointed out many times, it would be difficult to set the opening of the deer season at such a time as to prevent the killing of deer "in the velvet" or the killing of deer during the rutting season if a uniform season were established. The zoning system allows the opening of the season in the coast range where deer have matured their antlers at an earlier time than in the Sierra, where maturity takes place at a later date. Most of those conversant with conditions in California are ready to admit that there has been a great advantage in the districting system. The courts have upheld the present law.

HUNGARIAN PARTRIDGES IMPORTED

Last fall a special order was placed for some 1500 Hungarian partridges to be imported from Central Europe. Commissioner George B. Clarkson personally superintended the purchase. In late January the first shipment arrived by boat direct to San Pedro. About 600 birds arrived January 25, 1929, in rather poor condition because of the long trip by boat. A. W. Elder, of the Yountville Game Farm, took charge of the birds and they were temporarily housed at a private game farm until properly acclimatized. During the first week in February, the larger proportion of the birds was liberated in various places in southern California. Some of the birds were sent to the Yountville Game Farm to be used as breeding stock. Another shipment of birds was received in March.

SARDINE LITIGATION

During the past three months sardine litigation has again been to the fore. Three cases, two in the superior court and one in the federal court, have been fought, with the Fish and Game Division taking the side of conservation in seeking to curtail the waste of food fish by canners in reduction plants.

The first case was tried before Superior Judge J. R. Welch, Santa Clara County, sitting in place of Judge Jorgensen of Monterey County, who disqualified himself, due to the fact that he had before taking his seat on the bench represented one of the defendants in court actions. This case tried at Salinas lasted three days. The defendants were the Monterey Canning Company, Sea Pride Canning Company, Carmel Canning Company and San Carlos Canning Company. All were charged with failing to pack during a stated period, the fifteen cases of sardines per ton of fish brought in to the plants required by the Commission.

The defendants were represented by B. D. Marx Greene, former executive officer and attorney for the Fish and Game Commission. Eugene D. Bennett, present executive officer and attorney, assisted by Ralph W. Scott, appeared for the people, and made an excellent case. At the close of the trial, Judge Welch continued in effect the temporary order granted at the first hearing, which provided that each of the defendant canners must pack fifteen cases per ton of fish brought into their plants until he rendered his decision. On March 13, Judge Welch decided in favor of the people and ordered the four plants abated for a period of three months, effective on March 15.

The case hinged upon the right of the commission to issue the fifteen case order, and on the definition of the word "offal" which the defendants defined as all fish not put in cans, while the state insisted the word meant only heads, tails and cleanings of fish. Much conflicting testimony was offered, and the case was a hard fought one. N. B. Scofield, head of the commercial fisheries department of the division, was the principal witness for the people, while well known canners from Monterey and San Pedro testified for the defense.

Shortly after this closed case, the Van Camp Sea Food Company of San Pedro filed suit for an injunction against the Commission, seeking to restrain its officers from interfering with their operations or bringing action to enforce the fifteen case order and twenty-five per cent reduction allowance. Judge William James of the federal court granted a temporary restraining order, and the hearing was set before Judges Henning and James of the Southern Federal District Court and Judge Rudkin of the District Court of Appeals. After a long hearing, also bitterly contested, the three judges dismissed the case against the Commission and dissolved the temporary order. The most interesting feature of this decision is found in the statement that the state has a right to legislate for the protection of fish within the state even though but a small portion of the fish caught may be taken within the state's jurisdiction.

The division then started action against the Van Camp Sea Food Company, Southern California Fish Packing Corporation and the Wedum Packing Company in the superior court of Los Angeles County. This case lasted for two weeks and finally was decided adversely, Judge Clair Tappaan rendering his verdict in favor of the defendants, and declaring that canners

were allowed to use in reduction plants, twenty-five per cent of the capacity based on the capacity of can closing machines. This in effect means that for each can closing machine, which with packing tables, exhaust boxes and conveyors is a cannery unit, may divert 136.7 tons of sardines per calendar month to reduction plants.

Following this decision, the officials of the division have centered their attention on legislation which would eliminate the reduction allowance entirely.

house, and once it was passed in the house and failed in the senate. The main obstacles appeared to be those involved in a federal license fee and in a provision for public shooting grounds. Finally despairing of passing this bill, various friends of the measure united in supporting a new measure which eliminated the various objectionable features. Taking as the main viewpoint that game refuges are needed in order to help the waterfowl situation, and that the government should aid in establishing such

FIG. 42. Friends of a conservation measure. From left to right, Senator Peter Norbeck of South Dakota, President Calvin Coolidge, Dr. T. Gilbert Pearson, chairman of the National Committee of Wild Life Legislation, and Representative August H. Andresen of Minnesota. The President was urged by this delegation to sign the Norbeck-Andresen Bill, which provides for the government to expend about $8,000,000 for inviolate sanctuaries. Photograph by International News Reel Corporation.

THE NORBECK-ANDRESEN GAME REFUGE BILL

It took a number of years of striving to attain the treaty with Canada and the resultant laws relative to migratory birds. Likewise it has taken time for conservationists to secure federal legislation relative to the establishment of game refuges. It will be remembered that a game refuge bill has appeared in congress for six years, that once it was passed by the senate and failed in the

refuges just as much as in building good roads, the new measure was drawn. With little opposition, the Norbeck bill passed the senate at the main session of congress.

The National Committee on Wild Life Legislation, an influential group of men representing practically every national conservation organization in America was formed at Seattle during the meeting of the International Fish and Game Commissioners. This committee actively

espoused the measure and it was enacted into law by an unanimous vote of both houses and received approval of the president on February 18, 1929.

The bill, which is known by the short title of Migratory Bird Conservation Act, is designed to more effectively meet the obligations of the United States under the Migratory Bird Treaty with Great Britain by lessening the dangers threatening migratory birds from drainage and other causes; by the acquisition of areas of land and of water to furnish in perpetuity reservations for the adequate protections of such birds; and authorizes appropriations for the establishment of such areas, their maintenance and improvement.

A commission to be known as the Migratory Bird Conservation Committee, consisting of the Secretary of Agriculture as chairman, the Secretary of Commerce, the Secretary of the Interior and two members of the Senate and two members of the house of representatives is created and authorized to consider and pass upon areas of land, water, or land and water that may be recommended by the Secretary of Agriculture for purchase or rental as inviolate game sanctuaries. State approval must follow.

Proper financing of the project is accomplished by the authorization of $75,000 which, if appropriated, is to become available on July 1, 1929, for use in preliminary surveys followed by a $200,000 appropriation in 1930, $600,000 in 1931 and $1,000,000 for six successive years thereafter. Annual appropriations of $200,000 are authorized to pay the cost of maintaining and patrolling the established refuges after the ten year period.

Undoubtedly this game refuge bill is one of the most important wild life conservation measures thus far attained. There is great satisfaction in feeling that Congress recognizes the need for this aid to wild fowl and has been willing to authorize funds and proscribe a method of bringing about an improvement of conditions. The act definitely strengthens the arm of the Federal government in its constructive and progressive policy of bird protection. Legislation of this type guarantees a breeding stock of wild fowl for future generations of Americans.

TROUT FEEDING EXPERIMENTS

Every fish-culturalist these days is confronted with the problem of finding a suitable food for hatchery reared trout which will be less expensive than the long dependable beef liver. Experiments in eastern states have shown that trout can not thrive on any large percentage of food other than beef liver. It has also been demonstrated that sheep liver is not to be compared in value with beef liver. California, confronting this problem, is now undertaking a series of experiments to determine whether or not sardine meal, dehydrated salmon eggs, shrimp meal and alfalfa meal can be successfully substituted even in part for the well known food. With the help of Dr. K. F. Meyer a series of four expriments have been planned to run simultaneously in five different hatcheries using a number of different species of trout. At least one-fourth of the food used in these experiments will consist of fresh beef liver, the substitute foods will be tried out to determine whether or not trout can be successfully reared when a portion of their food is made up of these other materials. Pathological and chemical analyses will be made in the first place to determine the bacterial content of the foods used and in some instances, treatment will be given to reduce the bacterial flora.

This series of experiments should furnish accurate information as to the extent to which substitute foods can be relied upon. A balanced ration perhaps can be determined upon that will satisfactorily furnish necessary requisites to growing trout. If it were found possible to substitute dehydrated salmon eggs or shrimp meal, such foods could be shipped in sealed cans in such a way as to improve sanitary conditions.

DISEASE INVESTIGATIONS

The Division of Fish and Game is now well equipped to study diseases of game birds and animals. A pathologist, parasitologist and chemist are employed. All specimens of sick birds or animals should be sent directly to the Hooper Foundation for Medical Research, San Francisco, California, where under the direction of Dr. K. F. Meyer, post-mortem examinations and complete tests for pathogenic bacteria are made.

Numerous sick deer from the coast range examined at the laboratory show infestation with lung worm, a common parasite in domestic sheep.

Experiments and blood tests are being continued in connection with the duck disease investigation.

BANDED DUCKS RECOVERED

The following interesting series of returns relative to ducks banded indicate widespread dispersals. Banding operations at Lake Merritt, Oakland, California, are apparently responsible for the interesting series of returns;

Species	Banded at	Date	Found	Date
Mallard	Moiese, Mont.	Nov. 1, 1928	Nr. Sebastopol, California	Dec. 14, 1928
Pintail	Irvington, Cal.	Jan. 28, 1926	Bear Island, California	Jan. 14, 1929
Pintail	Lake Merritt, Cal.	Jan. 17, 1928	Newark, California	Nov. 28, 1928
Pintail	Lake Merritt, Cal.		Tule Lake, California	
Pintail	Lake Merritt, Cal.		San Leandro Bay, Cal.	
Pintail	Lake Merritt, Cal.		Live Oak, California	
Pintail	Lake Merritt, Cal.		Lake Earl, California	
Pintail	Lake Merritt, Cal.		Butte Basin, California	
Pintail	Lake Merritt, Cal.		Emeryville, California	
Pintail	Lake Merritt, Cal.		Gustine, California	

A VICE PRESIDENTIAL PROCLAMATION

The whole of our business life takes root in nature. All of our progress and prosperity is predicated on the abundance of our natural resources and the manner in which we develop them for man's use. But nature is not inexhaustible. We can not continue to draw upon the resources of nature without giving something back to nature. The minerals we find in the earth can not be restored, but the riches we take from the fields and the forests and the streams can be replenished. Some day, and perhaps much too late, we shall learn the lesson of conserving and restoring these assets.

Qualities of mind and body can not be measured in terms of dollars, and yet we must credit much of the wealth and greatness of our country to the fact that so large a part of our people spring from sources that have been close to nature. All of us who spent our childhood in the fields and forests have the feeling that we want our children to have some of that contact with the out-of-doors. We can not help believing that the days we spent following a faithful dog, or sitting on the bank of a stream paying more attention to nature than to the bobber in front of us, put something into our minds and hearts that we want our children to have.

And yet, how scant are the out-of-doors opportunities for our children as compared with our own, and how much less must be the contact with nature, unless you make it your business and I make it my business not only to save what is left to us of the out-of-doors, but to restore that which we and our fathers have destroyed.—Charles G. Dawes, *Outdoor America*, January, 1929, p. 12.

ACCOMPLISHMENTS OF A VOLUNTEER SYSTEM

An examination of the reports of over 492 volunteer deputies constitutes one of the most conspicuous pieces of evidence that the regular patrol of the Division is being greatly assisted, and that the volunteer system has developed into an efficient, valuable unit. Nor should it be taken for granted that all the time and energy of the volunteer force is expended in law enforcement work. Volunteer deputies have had a share in the job of stirring the people of the state to the penalty of squandering their heritage of fish and game and leaving but beggarly remnants for their children to enjoy.

Reports of these men over a six-month period ending the first of this year show that 421,016 miles of fields, streams, lake and bay shores were patrolled. These reports show a total of $9,890 in fines collected and turned in for 219 arrests for violations of the fish and game laws. They also show that 14,717 hunting licenses, 10,308 angling licenses and 4837 deer tags were checked.

One of the most conspicuous cases was worked up by a volunteer deputy of Salinas, assisted by a regular deputy. The offense involved the killing of a doe at night with the use of a spotlight. The violator was an alien and had no license. He was fined $600. Another case made by a volunteer deputy of Calistoga assisted by the regular force was for the slaying of a doe which, in this instance, was carrying two fawns. One of the defendants had the reputation of being a chronic offender and was fined $500; the other paid a fine of $250.

Federal forest rangers have been named volunteer deputies by the Division. The scope of their activities touches in a certain way the field of the regular patrol. What better proof can be offered of the good work the federal foresters are doing to aid fish and game conservation than the fact that they made sixty-four arrests and checked 10,672 angling and hunting licenses while on duty in the national forests between July, 1928, and January, 1929.

DEER HUNTING AND SPORTSMANSHIP

With the decrease in abundance of game, methods which permit easy taking or wholesale destruction have been prohibited by law. In former days when deer were everywhere common they were shot at night with the aid of a torch lure, were imbushed in runways or driven into water and dispatched, sometimes with a knife.

Torch hunting at night was a most picturesque sport, but involved little expenditure of effort and still less skill. The curious and bewildered animal approached within very short range and was killed often with a load of buckshot.

Now hunting is one of the means of gratifying the desire for recreation and contact with the out-of-doors. Except in rare instances, game is not killed merely for its food value. In its highest expression as a sport, hunting has become a game of skill. Stalking deer, for instance, requires skill. It takes an immense amount of patience and can be well done only after much practice and experience. A successful player of this game knows the habits and ways of the deer he seeks. He moves carefully and pauses often. He matches his wits with that of the animal sought. If he can drop the wary creature after a fair stalk, he can indeed take pride in his skill.

A first class sportsman would be ashamed to conceal himself on a trail leading from a park where deer have responded to protection and become quite tame. In such cases where deer are not educated to the gun, they cease to be crafty and hunting them involves no skill whatsoever.

Reliable reports have come that hunters lie in wait for deer migrating out of the Lassen National Park to their winter quarters and bag a considerable number of tame Lassen Park deer every season.

To the true sportsman such activity should be without interest or zest!

SOME VALUES OF GAME RESOURCES

The Canadian-Field Naturalist, January, 1929, prints a very able paper on "Moose in Nova Scotia," by Otto Schierbeck, the conclusion of which is reproduced here:

"The game of a country must serve two purposes. First, to provide pleasure for sportsmen and tourists and thereby, through licenses, give revenue to the government, and through the hiring of guides, buying of supplies, hotel trade, etc., give revenue to the population at large.

"Second, to the farmer who lives in the vicinity of the forest, the game provides a cheap winter food and the fur-bearing animals provide him with an income from trapping.

"The Canadian farmer has an ingrained love of liberty and strongly resents any restrictions, especially in regard to game. The old-time severe game regulations of the Old Country, inflicting heavy punishment upon poachers on the big noblemen's estates, were often the cause of

FIG. 43. Jay C. Bruce, state lion hunter, with a lion kill, decorating his fully equipped automobile. Lion hunter Bruce, although handicapped with the loss of one eye, is after lions again.

deportation of the offenders to the colonies, and one of the outstanding signs of freedom in the New Country was the entire absence of any restrictions in hunting rights.

"Effective game protection, however, can only be achieved if these two conflicting interests will 'bury the hatchet' and cooperate in a proper understanding. The sportsman must recognize the farmer's rights and the farmer will then see the advantage the sportsman furnishes him by giving him work as guide and creating a market for his products."

IMPORTANCE OF SCIENTIFIC RESEARCH

Daily those who are intimately concerned with the preservation and restoration of fish and game are coming to realize the fundamental place science is assuming in adjusting natural conditions to the progress of civilization. To be more specific, scientific research is becoming the solid means of assuring a supply of fish and game for the future. In an article entitled, "Conservation and the Handwriting on the Wall," *News Bulletin* No. 26 of the E. I. DuPont de Nemours and Company, L. W. T. Waller, Jr., writes as follows:

"Sportsmen, and conservationists desire one thing—perpetuation and increase of our wild life. This then is the 'progress' we are after, and its price is unquestionably 'research which alone assures the security of' hunting. * * *

"Example after example of the necessity of research in conservation matters could be piled up.

"A few plantings of foreign bird species in areas unfitted for their welfare with consequent loss of time, money and enthusiasm, yet who can say what the requirements of such areas are?

"Loss of literally millions of wild fowl from 'duck sickness'—why?

"Loss of (probably) millions of wild fowl in their breeding areas. What can we do about it?

"Steady decrease in native game, such as quail, in areas of intensive farming and overgrazed cattle areas. Can we bring these back by scientific planting?

"Loss of quail, grouse and rabbits from disease—why?

"Such examples could be prolonged far beyond the pages of this bulletin, but to what avail? We either see and can read the 'Handwriting on the wall' or we do not, and it is to be feared too many of us are modern Belshazzars. Millions of ducks and tons of game are dying or not reaching maturity every year, which could be saved, while we haggle over relatively minor questions such as—seasons, bag limits of whether the game commissioner is a Democrat or a Republican.

"We can not legislate 'game on the hoof' and we have certainly demonstrated the utter failure of restrictive legislation; which, if it can not save game, surely can not restore it. Restricted legislation is necessary; bag limits and seasons are essential, both if anything more exciting, and all certainly more rigidly enforced, but we can not rest there. The big thing is scientific research, adequately planned, painstakingly carried out and the findings made use of by federal, state and sportsmen's organizations to insure the 'dividends' we want in the form of a continuing yearly game crop adequate to meet the needs (within reason) of the sportsmen of this country."

PENNSYLVANIA'S DEER PROBLEM

The Pennsylvania Game Commission has for several years felt that the deer herd of the state must be reduced in numbers. They were convinced that does were too numerous and after attempting many methods of improving the situation declared an open season on antlerless deer in 1928. This declaration aroused much antagonism. A recent Bulletin (No. 12) entitled, "The Pensylvania Deer Problem," contains the following interesting conclusions:

"Now that the 1928 special open season on antlerless deer has passed, and we have had opportunity to study carefully some of the results, we have come to the following conclusions:

"First, that female deer are just as desirable as game animals as bucks. Many hunters who thought they could walk up to a doe as easily as they could approach a cow, went home without even having had a shot at a deer. After the first day or two of heavy shooting, the keen senses of the female animals asserted themselves to such an extent that thereafter very few does were killed. This proves that does are just as hard to bag as bucks.

"Second, that hunting accidents were less frequent than in the 1927 deer season.

"Third, that over-crowded conditions of the herd have resulted in the poor development of antlers among the young bucks.

"Fourth, that the breeding period of deer is so upset as a result of the unbalanced condition of the sexes that many fawns are produced too late in the season for them to compete with their elders in securing food during the winter.

"Fifth, that while deer observed in the fall appeared to be in a healthy condition because there was an abundance of food at that time, this fact has little bearing upon the food problems which develop, during severe winter weather, among young fawns.

"Sixth, that while no serious disease has been noted thus far this is no proof that a continuance of over-crowded conditions will not eventually induce such a disease.

"Seventh, that the Game Commission will continue to curtail the planting of

4. The percent of doe not reproducing fawns is apparently high.

5. There has apparently been some change in the estral period of the doe.

6. The unbalanced condition of sexes has been partially responsible for the change.

7. The present state of health in the deer herd is good, so far as communicable diseases concern them.

8. Barriers should be constructed to prevent the introduction of diseases of domestic animals.

FIG. 44. Captain William Lippincott and Sheriff John Runner with specially equipped gun for spotlight hunting of deer which was recently confiscated. The light was powerful enough to send a beam a thousand feet. Photograph by Humboldt Standard, January, 1929.

orest tree seedlings until they are certain hese will not be consumed by deer which ack sufficient natural food during winter."

Further conclusions were as follows:

"1. The Board of Game Commissioners s confronted with a problem relative to he deer situation that deserves further tudy.

2. The sportsmen should voluntarily dere an organized effort for such study.

3. There is an unbalanced condition of exes in the deer herd.

9. Feeding material for the deer is becoming scarce and will be more so as the herd increases.

10. This year's doe season will tend to increase the size of the deer herd rather than reduce it.

11. Shooting of deer should not be confined to one sex after the proper sex balance is established and is indicated only as one or the other sex becomes too plentiful.

12. The deer season should not come in the season of repeated estrum.

13. The older bucks should be preserved for a time for breeding.

14. The relation of age to sexual maturity should be studied.

15. The herd should not be permitted to become sufficiently large to cause a food shortage."

THE DUCK SEASON

Reports from various sections of the state indicate that the past open season on wild fowl was the best in several years. An observer in San Diego County states, "I consider the duck season for 1928-29 in this county to be the best as far as numbers of different varieties of ducks for the past 20 years." Incomplete reports indicate that on the lakes of San Diego County, a total of 76,533 birds were bagged. On Lower Otay Lake the total amounted to 22,501; on Sweetwater Lake, 3473 pintail, 1070 canvasbacks and 6537 ruddy ducks were secured.

Most club hunters secured full bags and there was less complaint from the open shooter. Hunting in the San Joaquin Valley showed considerable improvement over recent years.

In spite of the fact that large numbers of geese were also killed, oldtimers in the Sacramento Valley are becoming convinced that geese are returning in greatly diminished numbers each winter. It will be remembered that not many years ago, no protection whatsoever was given to geese because of their depredations in grain fields. Now we find the same men who complained of damage, complaining that few birds are returning and that there is difficulty in securing limit bags. The limit now calls for but eight geese per day.

STEELHEAD FISHING CONDITIONS

The steelhead season, which closed on February 28, was one of the finest winter fishing seasons in years. The run of fish in the Russian River was a great one and fine sport was enjoyed by thousands of anglers. The holding off of the rains kept the river in excellent condition during most of the season. As an indication of the number of fish entering the river, the report of the ferryman at Markham's ferry following high water, was to the effect that a run of fish came in that took two hours to pass the ferry. After the big run was over, there were stragglers lying in the holes all up and down the river and many fish continued being caught. Reports from the Napa River are to the effect that many steelhead were caught there.

RIGHT TO FISH DEMANDED IN FEDERAL BILL

Senator Hiram Johnson has introduced a bill into congress which will safeguard the right to fish in various streams of the state. In recent years there has been a tendency for wealthy individuals or groups of individuals to purchase private land within national forests and then by exchanging private lands for government land along streams to prohibit fishing. Senate Bill 5462 provides as follows:

"Be it enacted by the senate and the house of representatives of the United States of America in congress assembled, That all patents hereafter isued to any public lands of the United States shall contain an express provision that the lands so patented shall be subject to the right of all persons to fish in any waters upon such lands in accordance with the laws and regulations of the United States and of the state in which such waters are situated, and to have access to such waters for the purpose of such fishing."

The measure does not affect private holdings along streams, but will prevent the closing to the fishermen government lands now open to fishing.

FINANCIAL STATEMENTS

For a number of years, financial statements of the division covering a three-month period have appeared in the Appendix to each number of CALIFORNIA FISH AND GAME. To obtain a statement for a six- or nine-month period, it was necessary to add figures together. It is now planned to furnish a continuous financial statement for each fiscal year. Thus, in the present number, there will be found a statement covering the first six months of the fiscal year. Where statements of the current three-month period are needed, it will be necessary to subtract. The new presentation has the advantage of giving the complete financial status of the division at each three-month interval of the fiscal year.

FISH RESOURCES IN LAKE ELSINORE

Several years ago, Dr. James G. Needham, of Cornell University, spent some time making a biological survey of Elsinore Lake. A report was published in the Journal of Entomology and Zoology, of Pomona College. After explaining that the lake lies in a shallow depression of the San Jacinto Basin filling a low spot in the line of an old geologic fault, a description is given of the main streams supplying the water to the lake. The largest of the streams is the San Jacinto

River which has its source in the lofty San Jacinto Mountains. During ordinary times, the San Jacinto River disappears in the sand of the plain. In flood time, however, it flows across the surface in a shifting, sandy, willow-bordered channel finally entering Elsinore Lake. The lake has no outlet except at times of long

FIG. 45. Albino deer taken near Chico by Floyd Earp of Oakland, Calif., a duck hunter. Judge George Reckers of Williams fined the violator $500. North coast Indians celebrated a white-deer dance in which skins of albino deer were utilized. Albinistic forms are nevertheless of rare occurrence. Photographs by H. R. Christensen, January 6, 1929.

continued floods. Its waters are alkaline, but the degree of alkalinity varies with the rainfall. After a few dry seasons the water becomes concentrated by evaporation.

Carp, black bass and blue-gilled sunfish apparently occupy the lake. A single smelt (*Leurichthys orcutti*), less than three inches long, was picked up at the drift line. Bullheads, though not seen, are said to exist in the lake. Fishermen in their cross-meshed nets, take large carp. Supposedly, the carp, which is the one abundant fish of the lake, were planted in the Santa Ana River and came into the lake years ago at time of overflow. This fish has taken possession and has crowded out the more valuable native fishes. Examination of the food of carp and of the sunfishes showed that practically all the free living animals of suitable size found in the lake had been taken. The carp especially the larger ones, had eaten much bottom mud containing organic residue and diatoms. The food of the sunfishes differed chiefly in that they had eaten fewer blood worms and very little mud. Though the population of this lake is scanty in species, it is rich in individuals. The crop of plankton crustacea is exceedingly large and the chief beneficiaries of this high productivity under existing conditions are the carp and the pelicans.

TROUT RESCUED

February 27, 28 and March 1 and 2, Abe Woodard, net foreman, and a crew of fourteen volunteers assisted by State Forest Inspector Briggs of Oroville, rescued from Concow Creek, Butte County, below the dam:

Number.		*Pounds.*
500	Rainbow trout approximately 4 lbs. each	2,000
100	Rainbow trout approximately 3 lbs. each	300
1,400	Rainbow trout approximately 2 lbs. each	2,800
435	Rainbow trout approximately ¼ lb. each	109
2,435		5,209

The fish were stranded in two large holes below the Concow Dam which had been emptied to clean the lake. Great difficulty was encountered in removing large boulders so that the ponds could be netted. The fish were then raised 130 feet over the dam in cans with the loss of but one fish.

This device is designed to remove all floating trash from irrigation canals and also to prevent the entrance of fish into such conduits.

Its motive power is derived from a current water wheel and as its mechanism is geared to run slowly, it has great power. This enables the machine to remove with ease large objects from the stream in which it operates. Two men have been placed on the teeth that carry the trash from the water and at the same time men have stood on the cross bars of the carrier and this weight has not noticeably slowed down the speed of the machine.

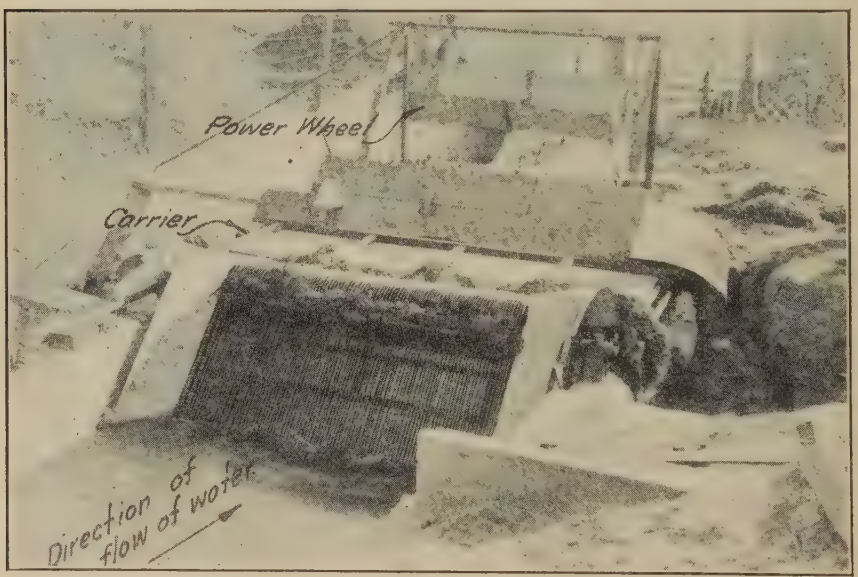

FIG. 46. A new type of self-cleaning fish screen invented by Francis Cuttle of Riverside, Calif. A circle of revolving teeth carry the trash on to a carrier which in turn deposits it in a pile at the side of the screen.

These trout would have become a total loss if allowed to remain as there was no stream flow.—George Neale.

SELF-CLEANING FISH SCREEN

A recent invention by Francis Cuttle of Riverside, originally designed for the removal of trash from canals is also an effective fish screen and meets an objection most often heard against their installation by divertors and users of water. Self-cleaning, parallel bar screens have been in use for many years in different forms. The screen is described as follows by Troxel & Waters, distributors:

The rack for catching the trash consists of steel bars, bent on a curve at the upper end, and are held in place to a cross bar at the upper and lower ends. The teeth for removing the trash are attached to a shaft which in turn is attached to sprocket chains actuated by a shaft attached to a spur shaft driven by the water wheel. Spacing of the bars may be arranged as required.

The teeth make one complete turn or round every two minutes on the machine shown in the picture, thus clearing all trash every two minutes. This speed can be varied if desired and as the motion of

the whole machine is very slow the working parts have very little wear.

The trash is deposited onto the carrier by the teeth which are then withdrawn by an upset arangement at each end. The teeth disappear under the bar to reappear at the bottom at the next round. The teeth have successfully removed a piece of two by four twelve feet long and have also removed a section of railroad tie twelve by twelve. Birds, small animals and larger objects are removed without difficulty. The carrier deposits all debris at one side of the canal.

Naturally the length of bars and width of rack of the water wheel will vary with different canals but the gears, teeth, upset devices, in fact everything but the length of the bars and width of water wheel, will be of one design. The speed will be regulated by the size of sprocket wheels on the shaft of the water wheel and the spur shaft.

GUADALUPE FUR SEALS

In recent years it has become apparent that the fur seals of Guadalupe Islands are increasing in numbers. Correspondence between the Department of State and the Mexican government was undertaken last year with the view of considering what steps would be advisable for protecting this herd. In December, 1928, the American embassy at Mexico City advised the Department of State that the Mexican Ministry of Agriculture and Fomento had reported that, by a resolution adopted on July 6, 1928, the Island of Guadalupe and the territorial waters surrounding it were declared restricted with a view to the protection of the breeding grounds of fur seals situated off the coasts of Lower California.

The above-mentioned ministry has issued instructions to the Department of Fisheries in Lower California advising it to inform those shipping companies that send their vessels to fish in Mexican waters to order their captains and owners not to molest, nor to allow their crews and fishermen to capture, elephant seals and fur seals, nor to accept these animals for transportation when requested to do so by private individuals.

It is hoped that the effort the Mexican government is making to rehabilitate both the Guadalupe fur seals and the elephant seals will be successful, and that these herds will regain at least a good part of their former size.—Fisheries Service Bulletin No. 165, Department of Commerce.

THE COMMON CAT—BIRD KILLER AND DESTROYER OF WILD LIFE

The life history of the common cat is written in blood.

A conservative estimate of the number of cats in the United States is approximately 25,000,000.

Careful observers who have watched and protected birds for a number of years report individual cats killing from 2 to 12 birds a day.

Ornithologists estimate that from 50,000,000 to 75,000,000 birds in the United States are killed annually by cats.

The stray or half-wild cat kills more small game birds and game animals than any other destructive agency.

Experienced gamekeepers regard the cat as one of the most vicious of vermin and destroy it whenever possible.

Thousands of domestic cats revert to the wild state and prey upon game birds and animals.

A sportsman may kill only five upland birds per day in Montana, but the cat respects no bag limit.

Each year we restrict the killing of game birds and game animals, but the cat knows no closed season.—Izaak Walton League of America.

THE GAME-BIRD SUPPLY

With increasing population and its correlated activities, the felling of forests, the draining of marshes, and the numberless developments that accompany the more intensive occupation of the land, it is inevitable that there should be some reduction of our wild life. This is especially evident in the case of our game birds and notably during the past 25 years. The Department of Agriculture has endeavored to check this decrease as far as possible by education regarding the value of our wild life and by the encouragement of salutary legislation. No game birds are more important than the waterfowl. State, federal and international protection have helped stem the tide of destruction, but the real extent of our wild fowl resources is in doubt. It is now planned, however, by a nation-wide series of simultaneous observations to be made by trained volunteer cooperators, to gain a clearer view of conditions and enable the department to meet intelligently problems of game protection.—U. S. D. A. Bull. No. 1023.

RESEARCH BOON TO HAWK AND OWL

In the spring of 1927 the game commission of Yakima County, Washington, established a bounty on various creatures

supposed to be destructive to useful birds, especially upland game birds. The stomachs of 121 hawks and owls killed in the county and preserved for bounty were forwarded to the Bureau of Biological Survey for study. Examination by the bureau disclosed that all the birds had been preying chiefly upon ground squirrels, rabbits and mice—species so destructive in western states that the federal and state governments have been cooperating for years in campaigns to control them. As a result of the discovery that hawks and owls are really a protection rather than a menace to useful species, bounties are no longer paid on them in Yakima County.—The Official Record, Jan. 3, 1929.

NEW METHOD DEVELOPED FOR PLANTING BOBWHITE QUAIL

In the search for better methods in planting birds reared on the game farm, both European and American game breeders have hit upon a useful method applicable to partridges and bobwhite quail. The method is based upon the habit of the male birds of adopting a brood of young ones. In England, wild partridges are caught, caged near a brood of farm hatched birds, and after they show signs of adoption, the adult bird is liberated with the young.

In connection with the Cooperative Quail Investigations instituted by the U. S. Bureau of Biological Survey, this "adoption system" was used by five privately financed ventures in the vicinity of field headquarters. Eggs of bobwhite quail were obtained and incubated by the usual methods, but as soon as the chicks were hatched, they were taken from the bantams and given in batches of 12 to 15 to cock bobwhites that had previously been captured afield. The chicks were apparently adopted and cared for perfectly, and when a week old were released with their foster fathers. The system is proving to be an easy, workable one under conditions prevailing on southern quail preserves.

FEDERAL LEGISLATION ASKED ON INTERSTATE FUR SHIPMENTS

When furs have been removed from the jurisdiction of one state and commingled with articles of interstate commerce in another, usually they are not subject to state seizure. A bill has been introduced in the present congress to confer authority upon employees of the department engaged in enforcing the provisions of the Lacey act to seize illegal interstate shipments of the dead bodies of wild animals or parts thereof.—Annual Report Bureau of Biology Survey, 1928, p. 31.

IMPORTED GAME BIRDS

Last year the importation of birds into the United States included 84,915 Mexican quail, 12,620 Hungarian partridges, several shipments of pheasants, a few waterfowl, and other miscellaneous game birds. For the first time in several years a number of pheasants were brought in from England, chiefly to introduce new blood. Many of the Hungarian partridges were imported by the State of New York and others were shipped to states in the west, where considerable interest in their introduction has developed.—Annual Report Bureau of Biology Survey, 1928, p. 32.

STRIPED BASS INTRODUCED IN JAPAN

When the Japanese steamer *Korea Maru* left San Francisco on October 10, 1928, she carried on her poop deck a wooden tank with circulating sea water which contained 721 striped bass. The fish were furnished by the Division of Fish and Game in exchange for shipments of Japanese fish. After a sixteen-day journey with worries to the man, Mr. G. Setow, in charge of the shipment, in the form of storm and oily water, the fish arrived at Yokohama with but a small loss of 114. Japan's experiment in introducing this fine American food and game fish will be watched with interest.

MONTANA DUCKS WINTER ON PACIFIC COAST

As reported in the annual report of the Bureau of Biological Survey, June 30, 1928, outstanding during the fiscal year was the banding of 5,000 mallard ducks at the National Bison Range, Moiese, Montana, returns from which show that birds from that section winter chiefly on the Pacific Coast, from Washington south to southern California. This is one of the many instances where significant information has been obtained regarding the movements of waterfowl. The percentage of returns to the total number of waterfowl banded should afford a basis for calculating the approximate numbers of these birds when reliable information is obtained. A manuscript on this phase of the work has been prepared for publication under the title "A Method of Determining the Annual Fluctuation in the Abundance of Waterfowl."

WISCONSIN WARDENS GIVEN RIGID TEST

The state of Wisconsin gives an examination to applicants for game warden positions. This examination consists of four parts: First, the application, in which the applicant states his general qualifications; many applicants are eliminated on the showing made in this portion of the examination. Second, a written examination which is conducted in the several county seats of the state and which consists of two hundred and fifty questions relating to conservation law, enforcement provisions of the law and similar information. Third, testing the applicant's knowledge of natural history by requiring him to classify thirty marked game and song birds, and approximately twenty pelts of animals, all native of Wisconsin. Mounted specimens and pelts are used for this purpose. Besides this the applicant must name and classify thirty-five varieties of fish from colored plates and sixty-five native birds and animals illustrated in the same way. Each applicant is also subject to an oral inquisition to determine his personal fitness and general qualifications. Physical fitness is also taken into consideration.

It can readily be seen from the character of the examination that men who qualify under such a rigid test should be able to give excellent service. As a result of this last examination in Wisconsin, twenty temporary wardens were added to the force and several permanent officers, the permanent force being increased gradually.—*American Field*, Jan. 12, 1929.

OUTDOOR MANNERS

1. Your outdoor manners tell the world what you are at home.

2. What belongs to the public isn't your own—play fair.

3. Respect the property of rural residents—ask before using it.

4. Save fences, close gates and bars, go around planted fields.

5. People, live stock, trees and birds were never meant to be target practice backstops.

6. Respect the law—catch enough legal fish to eat, then quit.

7. Protect public health—keep springs and streams clean.

8. Clean up your camp and don't litter the highways with trash.

9. Finish what you start—carelessness with fires is cussedness.

10. Leave flowers and shrubs for others to enjoy. Do your share to keep outdoor America beautiful.—Compiled by Seth E. Gordon, Conservation Director, Izaak Walton League of America.

SCIENTISTS HELP SOLVE CONSERVATION PROBLEMS

A large number of scientific papers having a direct bearing on conservation topics were read at the meetings of the American Association for the Advancement of Science, held in New York City. On the program were five papers dealing with the subject of fish parasites afflicting bass, bullhead, channel cat and other species. Four papers treated of the life histories of parasites, with a view to their control. One paper discussed the distribution of minnows in the Great Lakes drainage area. Other papers, numbering fourteen, gave consideration to studies of fish pests, the development of fish eggs, studies of structure, respiration, and the like. One timely paper dealt with nutritional requirements of brook trout and their rate of growth. A new vitamin, needed by young trout for normal growth, was discovered in raw liver by a group of biologists at Cornell University, and received the provisional name "Factor H." Of miscellaneous topics there were three dealing with the subject of pollution and one with the structure and growth of the horns of the deer. At no previous meeting has there been so great emphasis placed on studies directly related to the subject of fishes, though for the past few years an increasing interest has been noted in the number and character of papers presented dealing with conservation topics.—*The American Field*, January 26, 1929, p. 87.

THE POSSIBILITY OF TULAREMIA IN THE RUFFED GROUSE

An article on "Tularemia in Birds" occurs in the *Journal of the American Medical Association* for May 26, 1928. It seems to be a condensation of an article by R. G. Green and E. M. Wade of the Minnesota State Board of Health in "Proceedings of the Society for Experimental Biology and Medicine," April, 1928, which I have not seen. In speaking of the occurrence of tularemia in rabbits, they say that the decrease in the number of wild rabbits and of the ruffed grouse has occurred simultaneously in Minnesota during the past four years and that cases of tularemia in humans have appeared at the same time. Because of these facts and the discovery of tularemia in the blood of many rabbits, they think that the decrease in the ruffed grouse may be due

to the same cause. They have demonstrated that the rabbit tick is an important carrier of tularemia and that the parasite is found also in game birds. They have shown that the ruffed grouse can be experimentally infected with the bacterium tularense as regularly as the rabbit, and think that the parasite may carry the disease from rabbits to the birds. Although no cases of human tularemia have been reported as the result of cleaning grouse, they think it probable that the grouse may be a source of infection and feel that the indications justify a careful search for tularemia in grouse dying from disease.—J. J. Murray, Lexington, Virginia. The *Auk*, Vol. XLVI, 1929, p. 110.

SPORTSMAN AND FARMER

The sportsmen of the country are a source of benefit and profit to the farmers. Probably no class of transients are freer spenders than the hunters and fishermen who come from the outside to our waters to enjoy their favorite sport. They must eat; they must sleep; they must buy gas, tackle and equipment; they rent boats; they sometimes hire guides. They make many demands which the resourceful farmer can capitalize. And it is a matter of common knowledge that every sportsman's organization favors the propagation of game and fish and their protection during certain seasons of the year. This helps the landowner who lives along the banks of the streams to be able to go out and fill his basket and satisfy his fish hunger whenever his fancy dictates. No question but the farmer owes something to the sportsmen.

It will be interesting to note with what success the committee meets in issuing the "Fishing Permitted" signs. The sportsment are serious in the movement. Will the land owners take them at their word? We think they will.—*Pennsylvania Sportsman*, Vol. 20, No. 4, p. 9.

STRIPED BASS ON TRIAL

Opposition has developed to the extension of the striped bass into waters of Oregon, on account of the claim that this aggressive species is destructive to salmon and trout on account of its voracious feeding habits.

The striped bass is not a native of western waters, having been transplanted into the California coastal waters from the Atlantic a number of years ago and having furnished an example of very extraordinary success in introducing a new species.

The Oregon State Fish and Game Department is conducting an investigation to determine the facts with reference to this charge against the striped bass. The stomachs of a number of specimens taken in Coos Bay have been examined but no salmon were found. Other fish were found in their stomachs, including flounder. Agents of the commission who have been familiar with the fisheries of Coos Bay and have examined the contents of the stomachs of many striped bass testify they have not found them containing salmon; most of the fish found were of noncommercial species.

On account of the intensity of the controversy, the matter will undoubtedly be thoroughly sifted so that the status of the striped bass with relation to the salmon may be definitely known.

The striped bass is a splendid sporting fish and is taken extensively by anglers. —*Game and Fish Conservationist*, Richmond, Va., Sept.-Oct., 1928.

FISH DUCKS AND FISH

Sportsmen visiting streams in the northern part of the state have often seen mergansers, commonly called "fish ducks," catching fish. They usually accuse these ducks of destroying trout at random, and therefore classify the duck as an undesirable predatory species. Some actual evidence of the food of these birds is now at hand. George Tonkin, federal game warden, and J. E. Plaisted secured five American mergansers on Smith River, Del Norte County, a clear stream with a rocky bed, rapids and quiet pools. The stomachs of these birds were sent to the Biological Survey and examined by E. R. Kalmbach with the following results:

No. 179838, 179839, 179840, 179841, 179842.
Name: *Mergus americanus*, ½ grown.
Locality: Smith River, Del Norte Co., California.
Where killed: Clear stream, rocky bed, rapids and quiet pools.
Date: July 11, 1928.
Hour: 4:30 p.m. to 6:30 p.m.
Collector: George Tonkin and J. E. Plaisted.

No. 179838.
Condition of stomach: Full.
Percentage of animal matter, 100; of vegetable, __; of gravel, etc., 35.
Contents: 1 nearly complete Cottus and remains of several others and spines of more than one stickleback (*Gasterosteus*), 85 per cent; crawfish remains and gastroliths, 15 per cent.

No. 179839.
Condition of stomach: Full.
Percentage of animal matter, 100; of vegetable, __; of gravel, etc., __.
Contents: 8 Cottus probably *C. asper*, 100 per cent.

No. 179840.
Condition of stomach: 2/3 full.
Percentage of animal matter, 90; of vegetable, 10; of gravel, etc., 30.
Contents: Fish remains including bones of sculpins (Cottus) and stickleback (*Gasterosteus*), 90 per cent; vegetable debris, 10 per cent. A mass of feathers also present, doubtless came from the bird's own body.

No. 179841.
Condition of stomach: Full.
Percentage of animal matter, 100; of vegetable, __; of gravel, etc., 20.
Contents: Fragments of gastroliths and other parts of crawfish, 5 per cent; remains of at least 4 Cottidea, 95 per cent.

No. 179842.
Condition of stomach: 2/3 full.
Percentage of animal matter, 100; of vegetable, __; of gravel, etc., 15.
Contents: A water strider (Gerris sp.), 1 per cent; at least 8 Cottus sp., 99 per cent; 2 Gastroliths of crawfish, trace.

REPORT ON BANDED WILD FOWL

Announcement is made by the United States Biological Survey that at the opening of the 1928 hunting season, between 15 and 20 stations were in operation for the banding of migratory birds. These stations extend from Maine and South Carolina on the Atlantic coast, to Washington, Oregon, and California in the west, with others in the Canadian provinces and in Alaska. More than 30,000 ducks and geese have been banded, and valuable information already has been received from the reports sent in by hunters. Sportsmen accordingly are urged to examine the ducks and other wild fowl they kill and report every band obtained.

The following records from the banding files of the Biological Survey will illustrate the character of the information that is being accumulated: A mallard banded at Leduc, Alberta, on October 23, 1926, was killed at Robertson Lake, Texas, on November 27, 1926. Two mallards banded at Browning, Ill., in November, 1922, were killed, one near Sacramento, California, in December, 1923, and the other in Glascock County, Georgia, in November, 1924. Another mallard banded in January, 1923, at Cuivre Island, Mo., was killed in June of the same year at Willow Lake, Mackenzie. A baldpate, or widgeon, banded in August, at Davidson, Saskatchewan, was killed near Houston, Texas, in December of the same year. A green-winged teal banded at Avery Island, La., in December, 1922, was killed in September, 1923, at Lethbridge, Alberta, and three others banded at the same time and place were recovered in the fall of 1923 and in 1924 from points in the Sacramento Valley, California. Another of these little ducks, banded on the Bear River marshes, Great Salt Lake, Utah, in July, 1926, was killed in November of the same year in the State of Sinaloa, Mexico.

The problems studied by this method of research chiefly relate to the mysterious migration of birds. New and pertinent facts are continually being brought to light through an intensive application of the banding method, and it is to aid these investigations that sportsmen are asked to cooperate by reporting all banded wild ducks and other species killed during the season.

HUNTING ACCIDENTS 1928

No computation of hunting accidents has been made since 1925. The computations were originally made to call to the attention of every hunter the need for care in handling a gun. It was thought that the long list of accidents might stir some to more carefully avoid such accidents.

There follows a tabulation of hunting accidents for 1928. Although the list is considerably longer than the one for 1925, yet we cannot definitely say that the number of accidents was really greater for the reason that during the past year, clippings relative to hunting accidents were ordered from one of the clipping bureaus. As a consequence, a fuller record has been available. The increased toll indicated probably shows the adequacy of the reports secured in former years. It has been impossible to verify the accuracy of he reports which have been taken entirely from newspaper clippings. Undoubtedly, as in past instances, there will be some reports of persons who have recovered, or whose injury was not as serious as indicated in the compilation.

Analysis shows a list of 43 persons killed; 26 of these deaths resulted from accidents where the hunter himself was responsible. The others were accidents where a companion was involved. Sixty-five different persons were more or less seriously injured; of these thirty involved a companion. Apparently but one person in the tabulation was killed as the direct result of being mistaken for a deer. As compared with former reports, this shows a worthwhile reduction in accidents of this kind. Apparently, the greatest danger is to be found in hunting from boats and from blinds, for the greater percentage of accidents for 1928 occurred in this way.

HUNTING ACCIDENTS, 1928—Killed

Name	Shot by	Date, 1928	Locality	Circumstances
H. L. Allison (18)	Companion	August 28	Chula Vista	Friend stumbled against gun which discharged, killing Allison.
Calvin Alvis	Self	December 21	Porterville	Fatally injured when gun exploded on being removed from machine.
Walter Barnes (30)	Companion	September 18	El Dorado County	Barnes and companion shot at same deer; he was in the path of cross fire, receiving full charge.
Robt. Davis (22)	Self	September 18	Nevada County	Victim leaving auto pulled gun toward him muzzle first, shooting himself through chest.
C. Dixon (23)	Self	February 20	Kern County	When unloading rifle, gun accidentally discharged, shot penetrating the brain.
Thos. Fleming (14)	Companion	December 15	Richmond	Was shot through neck when gun, friend was handing to him, accidentally discharged.
Fred Frazier	Drowned	October 22	Delta Section, Contra Costa County	Boat overturned while duck hunting.
Dr. E. D. Grandmason	Another hunter	September 20	Los Angeles County	Was mistaken for deer, and fatally shot.
H. Grawbarger	A. E. Moon	September 13	Placer County	Gun thought to be unloaded accidentally discharged.
Elton Guest (20)	Companion	October 8	Riverside County	Companion stumbled and gun was discharged, victim receiving entire charge.
Albert Gunn	Drowned	December 8	San Francisco Bay	Boat overturned while duck hunting.
Buster Hale (14)	Companion	February 12	San Diego County	Boys knelt down to shoot at ducks; victim rose quickly and was shot in head.
Ben Hauze (16)	Companion	July 31	San Diego County	Companion was walking behind victim when gun accidentally discharged, killing him.
J. D. Heuston (23)	Self	November 27	San Benito County	Gun accidentally discharged when it fell from rock.
Catherine Higgins (14)	Companion	June 26	Ramona	Victim was in back seat of car when gun held by hunter in front seat was accidentally discharged.
John Hitchcock	Companion	August 6	Colusa County	Knelt down to let companion shoot over head, received full charge.
Wood F. Hunter	Self	September 4	Visalia	Killed by accidental discharge of own gun.
Chas. Johnson (15)	Self	November 5	California City	Shot in body when gun exploded while getting into boat.
Orville Jones (29)	Self	January 15	Glenn County	Was climbing slippery bank when gun accidentally discharged.
H. Jorgensen (42)	Self	August 30	Lake County	While deer hunting, stumbled and fell, gun shooting him in neck.
James Kruza (14)	Self	October 29	Eureka	Accidentally killed while duck hunting.
Mrs. R. Lindblom (25)	Husband	September 28	Mariposa	Ran in front of husband's gun when he was shooting at deer.
Umbert Lippi (20)	Self	September 4	Amador County	Shot in neck when gun accidentally exploded.
Claude McClure	Emil Roar	May 5	Fresno County	Accidentally killed while rabbit hunting.
Phillip McHale (7)	Brother	August 10	Long Beach	Brother shot victim accidentally while hunting.
D. Mendenhall (14)	Self	December 1	San Diego County	While stepping from boat into duck blind, gun accidentally exploded.

HUNTING ACCIDENTS, 1928—Killed—Continued

Name	Shot by	Date, 1928	Locality	Circumstances
Geo. Mitchell (15)	Self	November 16	Salton Sea	Was in boat when gun accidentally discharged, killing him.
V. S. Neis (62)	Self	October 9	Los Banos	While removing gun from car was fatally wounded in chest.
John Nice	Self	August 20	Los Angeles County	Gun accidentally discharged wounding him in chest.
Lloyd Noya (24)	Self	November 22	Fresno County	Stepped into hole while hunting, gun discharged.
R. H. Page (14)	Self	December 5	Willits	Gun accidentally discharged, bullet penetrating the heart.
Ralph M. Pray	Self	November 19	San Diego County	While climbing out of duck blind accidentally shot himself.
Jos. J. Psenner (26)	Self	October 22	Los Angeles County	Was shot through the head while cleaning gun.
Hugh Rigby (16)	Self	September 17	Weaverville	Victim was shot in chest by own gun when he tripped and fell.
A. B. Schuck	Self	October 19	Los Angeles County	Fatally shot by gun he was cleaning.
Aaron Shepard (28)	Self	December 1	Monticello	While taking gun from auto it discharged, shooting him through the neck.
C. B. Smith (14)	Companion	October 9	Shasta County	All fired at same deer; was killed by stray shot.
L. E. Stockton (10)	Companion	August 11	Ramona	Companion's rifle accidentally discharged while being cleaned, bullet piercing victim's chest.
Geo. Sunderland (47)	Drowned	December 3	Lassen County	Broke through ice while duck hunting.
V. Vandeventer (20)	Self	October 23	Contra Costa County	Gun accidentally discharged while duck hunting.
Frank Ward	Companion	August 3	Bakersfield	Was killed when companion fell and gun exploded.
Thos. C. Wishart	Self	January 9	Sonoma County	Gun resting in seat behind him exploded, shooting him in back.
A. M. Woerner	Carl Woerner	October 17	San Diego Bay	In shooting from rowboat, companion behind him shot too low, bullet entering victim's head.

HUNTING ACCIDENTS, 1928—Wounded

Name	Shot by	Date, 1928	Locality	Circumstances
James Alberti (25)	Self	October 18	Stanislaus County	Gun beside him in auto discharged, shot entering shoulder.
Carl Anderson (16)	Companion	December 17	Fresno County	Shot in hip when friend's gun accidentally exploded.
Edgar Archer	Another hunter	September 24	Shasta County	Shot in back by unseen hunter.
Kenneth Barton (15)	Companion	December 17	Santa Rosa	Accidentally shot in leg while hunting.
Wm. Brick (19)	Self	November 13	Stockton	Shot through hand when holding it over muzzle of gun.
A. Burge	Self	November 8	Los Angeles County	Gun in bottom of boat accidentally discharged, shot entering foot.
Harold Campbell (21)	Self	September 15	Cherokee	Shot foot nearly off while cleaning gun.
Llewellyn Case	Another hunter	January 12	Santa Clara County	Shot by stray bullet while out hunting.
Chas. Collins (18)	Self	December 3	Nevada County	While beating through brush, gun discharged, shattering ankle.
John De Ross	Self	February 13	Merced County	Gun exploded, driving piece of steel into victim's neck.
Ernest Dulac	Companion	December 4	Sonoma County	Firing from opposite side of brush, companion's shot struck him in head.
Art Downhour (15)	Self	December 19	Monterey County	Dog knocked gun over, shot piercing chest.
Herbert Ellis	Self	October 9	Fresno County	Shot self through leg accidentally while hunting.
Frank Flux	Self	October 5	Lassen County	Gun struck rock, accidentally discharging, shooting victim in leg.
Kenneth Franklin	Self	June 9	Foot of Mt. Diablo	Shot in both legs accidentally while hunting.
L. L. Galbreath (48)	Self	December 12	Napa County	Dropped gun, shooting self in head.
Willie Ghiorzo (15)	Self	February 3	Stanislaus County	Fell while jumping over ditch, gun discharged, shot entering right side.
Eldon Hamilton	Companion	December 14	Klamath River	Friend aimed at quail but scattered shot struck victim in face.
H. H. Hanson (19)	Self	November 26	South San Francisco	Rested hand on muzzle of gun, shattering hand.
Leslie Hein	Ted Halton	December 13	Napa County	Received birdshot in body while in direct line of fire of companion shooting at ducks.
James Hemmingsen	Another hunter	December 20	Fresno County	A charge of birdshot hit telephone pole behind victim, bounced off, striking victim on lip.
Orrin Hurlburt (15)	Self	December 29	Turlock	Gun in back seat fell forward, shooting boy in arm.
Shirley Irvine	Self	June 28	Madera County	Shot through foot while handling shotgun.
Dr. Chas. Keith	Another hunter	October 6	Maxwell	Struck in face by stray shot while deer hunting.
Eddie Kent (16)	Companion	June 6	Redwood Canyon	Accidentally shot in foot while rabbit hunting.
Ardne Kirby (17)	Self	December 8	Riverside County	Was trailing gun over rocky slope when it accidentally discharged, shooting him in hand.
Henry T. Klaukens	Friend	December 10	Shasta County	Hunters were on opposite sides of thicket shooting at quail, shot struck him in eye.

Name	Shot by		Locality	Circumstances
Chas. Leide	Brother	October 3	Alameda County	Shooting from opposite sides of duck blind, shot struck him in eye.
E. L. McCall	Self	September 1	Oroville	When examining revolver, gun slipped and fell, shooting him in shoulder.
James McLain	Companion	October 4	Orange County	While duck hunting was accidentally shot by friend.
Peter Meghenasso	Self	September 3	Tulare County	Shotgun accidentally discharged, pellets striking him in face and hand.
Chas. Miller (19)	Self	January 12	Butte County	Fired gun while seated in boat, breech exploded, tipped boat over and cut victim's thumb off.
H. W. Nash	Self	September 9	Riverside County	Tripped and fell, gun exploded, shooting him in arm and ankle.
Dr. G. K. Nider	Self	September 17	Fresno County	While on horseback shot at coyote, horse reared and shot struck victim in leg.
Dr. L. H. Nielsen	Self	September 7	Monterey County	Gun barrel burst when fired, injuring his left hand.
Wm. Nunes	Companion	December 4	Stockton	Accidentally shot in eye by stray shot from friend's gun.
Pete Ondazzo	Companion	August 25	Atherton	Dropped gun, shooting himself in ankle.
Walter Orm	Self	December 10	Ventura County	Gun in seat of car exploded when car struck bump, shooting him in leg.
John E. Overstreet	Friend	December 27	Shasta County	Was shot in head as he rose from a clump of brush he had used as a "blind."
Emil Ott	Clark Whaite	October 12	El Dorado County	Both fired at same deer from opposite points, bullet struck victim in the abdomen.
Mrs. G. Parkinson	Another hunter	December 20	Fresno County	Was in path of scattered shot which struck her in arm and face.
Thos. Partin (11)	Self	September 7	Merced County	Picked up gun by barrel, trigger caught, shooting him in abdomen.
Gregory Peck	Son	November 4	Los Angeles County	Was seated behind father in boat, shot low, striking victim in right shoulder.
Elwood Peters (19)	Brother	December 24	Oakland	Gun accidentally discharged, shooting victim in legs.
Ernest Phipps	Self	July 11	San Luis Obispo County	Reached for gun, trigger caught in pile of sacks, shooting him in hands.
Guy Polson (19)	Self	November 16	Los Angeles County	Motion of car jarred gun from seat, discharging shot which struck victim in head.
R. Posanelli	Another hunter	October 8	Monterey County	Was hunting on duck preserve when shot from another hunter struck him in eye.
Dale Pyle	Self	March 30	San Diego County	Shot in thigh by gun which he knocked from fence.
Cyrus Samuel	Self	February 14	Stanislaus County	Put finger in end of gun to remove dirt and finger was blown off.
P. Schleifer (15)	Companion	December 17	Alameda County	Shot in arm by friend when trigger of gun caught in sweater.

HUNTING ACCIDENTS, 1928—Wounded—Continued

Name	Shot by	Date, 1928	Locality	Circumstances
J. Scott (18)	Self	October 22	Alameda County	Gun in bottom of boat accidentally discharged, shooting off toe.
M. Shedden (15)	Self	November 6	Monterey County	Reached for gun in bottom of boat, gun discharged, shooting him in wrist.
Lawrence Shrum	Self	January 9	Stanislaus County	Injured by broken glass when gun fell from seat of car, bullet shattering windshield.
Everett Silva	Brother	April 12	San Luis Obispo County	In climbing over fence gun in brother's hand exploded, causing deep gash in victim's leg.
Rolla Smith	Self	January 13	Solano County	Was driving a tractor; had gun on trailer behind, barrel pointed towards him; going over bump gun discharged, bullet entering knee.
Clyde Stanley (14)	Companion	July 8	Napa County	Shot in thigh when he accidentally stepped in front of friend's gun.
A. D. Storck	Another hunter	September 20	Lake County	While hunting deer was accidentally shot in shoulder by stranger.
L. H. Taylor	Self	September 4	Siskiyou County	Accidentally shot off finger while deer hunting.
Roy Thomas (11)	Friend	December 24	Bay Farm Island	Shot accidentally in arm by companion.
W. Thornton	Companion	May 18	San Diego County	Friend's rifle accidentally discharged, bullet glanced from rock and struck victim.
Ray Tofanelli	Another hunter	October 8	Monterey County	Received a stray shot in eye while sitting in canoe duck hunting.
Geo. Wadsworth	Companion	January 17	Butte County	Was shot in hip and back when gun, friend was loading, accidentally discharged.
Mrs. J. W. Walker	Self	November 25	Shasta County	In placing rifle on ground gun accidentally discharged, shot entering thigh.
Dr. Fred Williams	Friend	December 6	Fresno County	Companion stumbled and fell, gun discharged, striking victim in groin.
Hugh Wrigley	Self	September 21	Trinity County	Accidentally shot himself in abdomen while hunting deer.

SUMMARY HUNTING ACCIDENT DATA, 1928

Number of persons killed	43
Number of persons wounded but not killed	65
Number self-inflicted accidents:	
Fatal	26
Nonfatal	35
Number accidents inflicted by others:	
Fatal	17
Nonfatal	30
Occurred while hunting large game (deer, bear, etc.):	
Fatal	9
Nonfatal	5
Occurred while hunting small game:	
Fatal	20
Nonfatal	27
Occurred while hunting unknown game:	
Fatal	14
Nonfatal	33
Weapons causing accidents:	
Rifles	27
Shotguns	68
Revolvers	1
Unclassified	12
Where occurred:	
In fields or on waters	63
In forests	10
In conveyances	12
Unknown	23
Number injured or killed in mistake for game or other wild creatures, if known:	
Killed	1
Wounded	0

EXPLOITATION BAD POLICY

It can not be too often or too strongly emphasized that the current practice of advertising and exploiting the fishing opportunities on lakes and streams of the several states by tourists and recreation resort interests is a bad mistake. There is a strong sentiment against this among many resort owners themselves and many of them are now issuing beautiful and attractive advertising without making use of the disgusting fish hog pictures which formerly decorated all such publicity. Others not having seen the light still persist in this kind of advertising, which is bound eventually to have a very unfavorable reaction on their business.

The fish propogation departments of every state and of the United States are exerting their utmost efforts to meet the demand for restocking and all possible protection is given by law to fish in spawning time nearly everywhere but there is continued complaint that fishing is growing steadily poorer, notwithstanding the efforts that are made to maintain it. This being true, it would seem to be the height of folly to try to induce more people to take the choice varieties of game fish and thus hasten the depletion. Every state which maintains a tourist advertising bureau has an abundance of attractive features which can be exploited to attract visitors without telling them that the streams and lakes are overflowing with fish and that the fishing is exceptional. Such advertising is usually untrue and misleading as well as destructive. It ought to be discouraged by every sportsmen's club in America. This sort of exploitation is nothing more or less than commercializing a resource which demands greater protection and more encouragement by propagation if it is to be maintained.—*Game and Fish Conservationist*, Richmond, Va., Sept.-Oct. 1928.

LEARNING THE WAYS OF FISH

It is a sound theory, and more than that, which teaches that every fact learned supplants a guess. Thus, one feels certain, the California Fish and Game Commission is serving not only its own commonwealth, but the entire Pacific west, in its establishment of a fisheries research laboratory for the purpose of obtaining needed information as to fish supply. It will be determined, in so far as is possible, how heavily the numbers of each species may be drawn upon without danger thereto; while at the same time, as would follow, any changes occuring in the supply would be remarked, together with the point at which depletion manifests itself.

This is a large undertaking, and its objective will be reached only after years of observation, study and effort. Indeed, it will be a work that never is done, but whose every revelation must be beneficial. Little is known of the ocean habits of valuable anadromous fishes, such as the salmon. Much less is known of the food varieties that pass their entire period of existence in the sea. N. B. Scofield, to whose vision the project in large measure owes its beginnings, has taken thought of a need not heretofore unremarked but one that certainly has been subject to grave neglect.

To such movements there is always opposition. The scoffer laughs at the application of intelligence, of research, to problems which previously have been guessed at by minds attuned to muscular effort. Those directly identified with the industry probably will fear that they may not take and use all that they can capture, without thought of the future. But if the California commission discovers only a few facts each year concerning the habits and life histories of each of the many food fishes caught in the oceanic dooryard, the way to future conservation,

to preservation of species, will be more plainly blazed. Obviously these facts will be invaluable for the prevention of depletion of over-fished species, a depletion which might otherwise end in disappearance. The undertaking belongs to California, but the benefits will be felt by all the coastal fisheries.—Editorial from the *Morning Oregonian*, January 28, 1929.

VIRGINIA'S GAME WORTH MILLIONS

According to a report of the State Commission of Game and Inland Fisheries. game killed in Virginia during the 1927-1928 season is valued at over two and one-half million dollars. The survey of the commission reveals that the number of animals taken totals 1,638,163. Rabbits, squirrels, doves and quail are shown to be plentiful during the season; opossums, coots, turkey and deer were said to be "medium," and muskrats, minks, raccoons, otters, bears, woodcocks, ducks, geese, brants, gallinules, clapper rails, sora, snipe, pheasants were all classed as scarce.

Totals for the various kinds of game bagged are as follows: Rabbits, 409,491; squirrels, 530,408; muskrats, 68,000; minks, 12,266; opossums, 94,826; raccoons, 17,798; otter, 138; bears, 909; doves, 49,457; woodcocks, 4,190; ducks, 66,764; geese, 7,403; brants, 210; gallinule, 100; coots, 6,330; clapper rails, 1,315; sora, 20,000; snipe, 10,820; bobwhite quail, 315,452; pheasants or grouse, 13,220; turkey, 8,219; deer, 687.

Similar computations for California are difficult as hunters are not required to report the game killed except in the instance of deer. The game census is coming to be looked upon as fundamental to wise administration of game resources.

NEW "WILDERNESS" AREAS ESTABLISHED

In order to insure the preservation, in their primitive condition, of typical mountain and forest areas of California, and to guard against their development and exploitation by modernized recreational features the United States Forest Service, announces the setting aside of fourteen separate tracts of national forest land, embracing a total of over one and one-half million acres, as "wilderness" areas for the use and enjoyment of all the people. These areas will be preserved in a "wild" state in the sense that they will not be developed by road building or opened to any form of permanent recreational occupancy under permit. The grazing of live stock will, however, be permitted, and in years to come, if economic conditions warrant, some timber cutting or water power development may be allowed by the forest service.

The national forests of California contain a portion of the last frontier of the United States. Within their limits exist many areas still in much the same primitive state as when the first waves of settlement extended into the west. They embrace many of the mountain ranges and peaks that in the early days served not only as landmarks to the pioneers, but as spiritual symbols of a new world and a new life. For these reasons, the pioneers and their descendants have regarded these peaks and wild areas with a well nigh religious veneration.

We are now conquering and subduing these wild areas by highways and other mechanical means of transportation, and by the congregation of great numbers of people who bring with them all the social and mechanical devices of our present-day civilization. In so doing we destroy in large degree the attributes which make these areas unique of their kind and cause them to command the love and veneration of men.

It is because of these facts, and the growing desire of a large element of our population for pleasures and conditions that nature alone can provide, that the United States Forest Service has created special "wilderness" areas, with their well known inherent capacity to recreate physical and mental powers, to give pleasure and inspiration, to advance science and knowledge, and to preserve national characteristics and traditions.

The newly created wilderness areas in the national forests of California are located, for the most part, in the higher and more scenic regions of the Sierra Nevada, Coast Range, and mountains of southern California, where the timber resources and fire hazard are limited, and where there is no necessity for the building of roads for forest administrative purposes. They will present an excellent opportunity to all outdoor enthusiasts who wish to rough it in regions remote from automobile travel and conventional camp grounds and resorts, and who desire to enjoy primitive nature without touch of human influence.

The names and locations of the newly created wilderness areas are as follows:

Middle Eel-Yolla Bolla—200,000 acres around Yolla Bolla Mountain and at the head of Middle Eel River in the California and Trinity National Forests.

Agua Tibia—27,000 acres on the west end of Palomar Mountain in the Cleveland National Forest.

Desolation Valley—41,000 acres north of Echo Lake and west of Lake Tahoe in the Eldorado National Forest.

Salmon-Trinity Alps—130,000 acres at the headwaters of Trinity and Salmon Rivers in the Klamath, Shasta and Trinity National Forests.

South Warners—75,000 acres around Eagle Peak in the South Warner Mountains of the Modoc National Forest.

Hoover—23,000 acres west of Mono Lake in the Mono National Forest. Named after Prof. Hoover, formerly superintendent of the Bodie mines.

Dana-Minarettes—87,000 acres lying between Tioga Pass and the Devil Post Pile National Monument in the Mono and Sierra National Forests.

Murphy Hill—12,000 acres surrounding Campbell, Morris and Lotts Lakes west of Belden in the Plumas National Forest.

San Gorgonio—19,000 acres covering the San Bernardino and San Gorgonio range in the San Bernardino National Forest.

Telegraph Peak—7,500 acres around Telegraph Peak, in the San Bernardino National Forest.

San Jacinto—22,000 acres covering the high country east of Idyllwild and Keen Camp in the San Bernardino National Forest.

Ventana—52,000 acres of wild mountain land at the north end of the Monterey Division of the Santa Barbara National Forest.

Emigrant Basin—98,000 acres on the Stanislaus National Forest lying between Kennedy Meadows and the north boundary of Yosemite National Park.

High Sierra—700,000 acres along the High Sierra crest in the Inyo, Sequoia and Sierra National Forests, from Mount Whitney on the south to the Mammoth Lakes region on the north, a distance of some 75 miles, all of which is wild, rugged mountains, traversed in part by the John Muir trail.

INCREASE OF DEER RAISES GAME MANAGEMENT PROBLEM

The annual game census of the United States Forest Service indicates that the number of deer on the national forests is almost everywhere increasing. This is in spite of the fact that except on certain areas set aside as game refuges the only restrictions upon hunting are those imposed by state game laws.

The forest service holds that the logical remedy is the development of game management plans. The basic principle of these plans is to establish and maintain a balance between the number of animals and their year long food supply.

A given land area under given conditions can grow only a certain quantity of game feed. The quantity available varies with the season. Thus when an excessive number of animals are seeking sustenance a short forage crop or an extra hard winter results in undernutrition, increased susceptibility to disease, and a struggle for life under which the weaker animals often succumb in large numbers.

At the present time the most acute situation on any national forest is on the Kaibab, in northern Arizona. The deer herd on this forest, containing more than 28,000 head, has outrun the food supply so far that fawns born the previous year have died, and many of the other animals as well. The forest service declares that acquiescence in this condition is both uneconomic and inhuman. A somewhat similar situation threatens the elk herds of the Yellowstone region.

Under a game management plan the aim would be to prevent overcrowding by finding out how many deer or elk the available land will carry permanently, and varying the amount of hunting permitted so that the herds of game will be kept at this number. Stable in place of fluctuating herds would mean a constant stock of breeding animals, would permit of utilizing the increase for food, and would prevent the decline in the productive capacity of the land which overgrazing—whether by domestic livestock or game herds—inevitably produces.

Rigid state game laws which make impossible the application of a flexible system may, however, create great difficulties for any rational management plan. This has been true in the case of the Kaibab deer. To the extent that wild life has a place in forest administration the forest service seeks to work in cooperation with the states for the development of the most favorable conditions.

An excessive number of deer not only means that they are subjected to undernutrition and are in danger of being killed off wholesale by starvation and disease but also, the forest officers say, results in serious injury to tree growth, since the hungry deer are forced to browse on anything they can reach, and thus destroy the forest reproduction. While deer normally subsist largely on browse, if the herds are kept within reasonable limits they can obtain an adequate food supply without curtailing the growth of the forest. As a first step toward introducing sound game management plans

the forest service is studying the conditions on the ground, locality by locality, in order to determine in each case what the limit should be.

SURPLUS ELK OFFERED BY GOVERNMENT

Surplus elk from the National Bison Range are being offered by the Biological Survey of the United States Department of Agriculture to anyone who will remove them without cost to the government. The National Bison Range is in western Montana near the towns of Moiese and Dixon. Because the elk there have increased beyond the carrying capacity of the range, it is necessary further to reduce their numbers, even though some of the surplus animals have already been disposed of by sale.

The National Bison Range is administered primarily for the maintenance of a fair-sized herd of buffalo, the original stock of which was supplied by the American Bison Society. It is the desire of the Biological Survey to make immediate reduction in the numbers of the elk so as to avoid feeding them hay during the late winter and early spring, which would otherwise be necessary, as well as to preserve as much forage as possible for the buffalo. The elk at this time are mainly valuable for exhibition purposes at zoos and for stocking game parks and farms. It is now too late in the season for the elk meat to be good.

Correspondence on the subject should be directed to Frank H. Rose, protector of the National Bison Range, Moiese, Mont. Telegrams should be addressed to him at Dixon, Mont.

EUROPEAN STARLING RAPIDLY SPREADING

The European starling, the alien bird that has spread from importations planted in Central Park, New York City, nearly 40 years ago, to most of the states east of the Mississippi, is rapidly spreading westward as a breeding species and is likely ultimately to be found throughout most of the area from southern Canada to the Gulf coast and westward to the Rocky Mountains, according to the United States Biological Survey, Farmers' Bulletin 1571-F, "The European Starling in the United States," just issued, sets forth the economic status of this bird according to results of the survey's studies, and Circular 40-C, "The Spread of the European Starling in North America (to 1928)," also just published, traces the history of the bird's extension of range, describes its methods of spread, and predicts probable future extensions. The spread of the starling is also summarized in the Farmers' Bulletin.

An intensive study by the department of the starling's food habits was based chiefly on the examination of the contents of more than 2600 stomachs of starlings, a greater number than that used for similar studies of any other bird that have been published so far. This investigation ed to the conclusion that most of the starling's habits are either beneficial to man or of an economically neutral character. Field observation has established the fact that the time spent by starlings in destroying crops, such as cherries, apples, and sweet corn, or in molesting other species of birds, is extremely short compared with the hours they spend searching for insects or feeding on wild fruits. It is pointed out that as a destroyer of the clover leaf weevil, the Japanese beetle, May beetles, cutworms, and grasshoppers —some of the farmer's worst pests—it is even more energetic than many of our protected native birds.

In spite of the fact that starlings in normal numbers exert an influence for good and may well be left unmolested when not inflicting noticeable damage, there are times and circumstances, say the investigators, under which they may become objectionable. To the city dweller, they say, the most conspicuous habit of the bird is its establishment of obnoxious winter roosts, which in eastern cities are sometimes of enormous size. Typical of such gatherings is the one that for years has occupied the trees and buildings on Pennsylvania avenue and other downtown streets in Washington, D. C. In spite of measures taken to drive them away, the birds have persisted and return year after year to the historic thoroughfare of the national capital. Methods used for eradicating starling roosts are given in the new Farmers' Bulletin, although, it is stated, no method at present in use assures lasting success, for if vigilance is not employed temporary eradication may be followed by reestablishment of the roost.

There is no doubt, according to the department, that there are local areas in which the starling is detrimental to agriculture and horticulture at the present time, but the factor of overabundance rather than pronounced tendencies for harm on the part of the individual bird has brought this about. There is no question, in view of its highly insectivorous food habits, it is concluded, that the influence of the European starling, in moderate numbers, in the United States is beneficial.

Copies of Farmers' Bulletin 1571-F on the economic status of the starling may be had free, as long as the supply lasts, on request addressed to the Office of Information, Department of Agriculture, Washington, D. C.

PROTEST AGAINST KODIAK BEAR PROTECTION ANSWERED

In line with the definite policy of the Department of Agriculture on predatory-animal control, which, while designed to safeguard farming and stock raising, is opposed to the extermination of any of the interesting species of the wild life of the continent, Secretary of Agriculture Jardine, in response to a lengthy petition presented through Congressional Delegate Dan Sutherland early in February, has explained their rights in the matter to residents of the Kodiak-Afognak Islands group of southern Alaska. The petitioners cited the growing agricultural activities of these islands and the losses connected therewith, particularly of stock raisers, through the depredations of the big brown Kodiak bear. This giant of the wild they consider the most vicious and dangerous of the carnivorous animals of Alaska. They asked that all protection be removed from the Kodiak bears, so as to permit all persons to kill them in any manner at any time of the year.

The present regulations allow an open season on large brown and grizzly bears from September 1 to June 20, with the proviso that these bears may be taken at any time when about to attack or molest persons or property, or when encountered within half a mile of a human habitation. The secretary in replying to the petition called attention to this fact, and he stated further that the Alaska Game Commission, after a careful study of the whole situation, has recommended a modification of the regulation that would doubtless accomplish all that the stock raisers and others ask. The new regulation, which is receiving favorable consideration, would give protection to these big bears as game animals as formerly, but with the further proviso that on Kodiak, Afognak, Raspberry, Spruce, and Sitkalidak islands any resident engaged in agricultural pursuits may kill such animals when they are considered a menace to persons, live stock, or property.

The secretary calls attention to the wider latitude thus afforded in control, and expresses his confidence that when ranchers on the islands learn of the proposed action, they will find they have sufficient leeway in necessary control measures against stock-killing bears. He also mentions the fact that preserving this species in the nonagricultural mountain area of the interior will serve to perpetuate what is known to scientists, sportsmen, and visitors to Alaska to be the largest carnivorous land mammal in existence.

The statement was cited of Paul G. Redington, who spent some time in the region in 1928, and of sportsmen who have come in contact with the species, that these giant bears do not relish the presence of man, and when unmolested rarely attack human beings. Their food consists for the most part of berries, alder roots, grasses, and other vegetation, with some fish, and while individuals may develop stock-killing propensities, they are not as a species inimical to agriculturists. The secretary states that the new regulation should be in effect by July 1, and expresses his conviction that the petitioners will thus obtain practically all they are asking for.

If the department should remove all protection from this notable species and thus open the way to its eventual extermination, there would be a heavy fire of justifiable criticism not only from the many organizations and individuals who have in the past derived both sport and pleasure from their contacts with the Kodiak bears, but from the people of Alaska as a whole, for the big-game animals of Alaska attract to the territory many people from the states and other countries and their expenditures for equipment, travel, personal service, and the like constitute what is by no means an inconsiderable contribution to the commerce of the territory.

The secretary assured the petitioners through Delegate Sutherland that the Alaska Game Commission and the office of experiment stations of the department will keep in very close touch with the situation to note the needs on the island in question.

DIVISION ACTIVITIES

Bureau of Patrol

A survey of the activities of the patrol bureau for the calendar year 1928 shows that $92,020 were collected in fines for violations of the fish and game laws, 2525 arrests were made, and a total of 1825 days were served in jail by violators.

During the month of January, 1929, over 200 arrests were made on which fines in the amount of $10,065 were imposed. Two violators were given jail sentences of 100 days each, four, sentences of fifty days each and four others, sentences ranging from 10 to 5 days.

A number of recent changes were made in the southern patrol force: Deputy L. W. Hare was transferred from Owensmouth, Los Angeles County, to Santa Ana, Orange County; Deputy R. J. Tepper, from Fawnskin, San Bernardino County, to Hemet, Riverside County; J. W. Thornburg, from Markleeville, Alpine County, to Brawley, Imperial County; Webb Talbott, from Santa Ana, Orange County, to San Fernando, Los Angeles County; and Cliff Donham, from Westmoreland, Imperial County, to Escondido, San Diego County.

K. K. Langford was appointed a deputy and will concentrate his activities in the mountain sheep district, San Bernardino County, which has been one of the most difficult areas in the south. It is hoped that the addition of this new man will improve conditions.

The new deputies added to the patrol department are proving to be efficient officers. They are obtaining the cooperation necessary from the people in their districts and this, in turn, is being reflected in their accomplishments.

Floyd Earp, of Oakland, was arrested near Maxwell by Captain S. J. Carpenter and a posse of seven deputies. Taken before Judge George B. Reckers, of Williams, Colusa County, he was fined $500 and learned to his sorrow that deer meat in one's possession after the season closes is, indeed, costly.

Deputies J. C. Schneider and Fred Post located fifty pounds of spoiled deer meat in a tank house on a ranch of Jerome Griffin, in Priest Valley, Monterey County. Arraigned before the court of Judge C. J. Giacomazzi, of Soledad, he paid $5 a pound for the deer meat found in his possession.

Adolph Sousa, of Knights Valley, has a reputation for being a consistent violator. It is hoped that he came to the end of his trail in Feburary when fined $500 by Judge John Ellis, of Geyserville, for killing a doe, which, in this instance, was carrying two fawns. It is alleged that the defendant had crippled another deer which escaped.

Credit for this case is due to volunteer deputy B. B. Kettlewell, of Calistoga. Captain Henry Lencioni and Deputy J. H. Groves cooperated and lent their necessary support. Because Manuel Sousa, brother of the defendant, was an accessory in the case and in possession of the slain doe, he was fined $250.

The efficiency and worth of the volunteer deputy system as an aid to the regular patrol was proved again when Jerry Oscar and W. I. McCullough, of Crannell, Humboldt County, were apprehended for having deer meat in their possession in closed season. Two volunteer deputies, Harold Ehreiser and Delbert Scott, arrested the defendants near Blue Lake. With the assistance of Captain William Lippincott, they brought the violators into the court at Eureka. The defendant Jerry Oscar was fined $100; the other, however, refused to enter a plea of guilty and came to trial at a later date.

Feeding deer meat to the employees of the Horse Mountain Mine located near Eureka, in Humboldt County, has resulted in an increase, instead of a decrease, in the overhead of operating the mine. It was suspected that the employees of the mine were carrying deer meat in their dinner pails and on investigation, deputies R. J. Yates and W. J. Harp found fresh deer meat and fifty-one pounds of cooked deer meat in the mine cook house. R. E. Bonine, secretary of the company, assumed the responsibility for the offense and was fined $150 by Judge Robert Allison, of Blue Lake. Both deputies are new in Humboldt County, but their prompt and efficient action in this case shows that they have their new district well in hand.

Ordinarily, hams do not cost a fabulous sum. It happens, however, that one taking the risk of shipping a ham of venison out of season, if caught, may pay a very high price. This discovery was made by Grant Donham living on a ranch in Callahan, Siskiyou County, when he shipped deer meat to a friend in Oakland. The meat fell into the hands of Deputy J. L. Bundock who notified Captain Sam Gilloon, at Shasta City of the violation. The violator was apprehended by Captain Gilloon and Deputy Brice L. Hammack. Judge H. G. Reynolds, of Fort Jones, assessed a fine of $100.

sufficient breeding stock is on hand to safeguard a supply for the future with protection accorded to does, fawns, spike bucks and a limit of two deer per hunter each season. However, if the laws affording protection to deer are not observed, it will be impossible for deer always to remain abundant. The need for severe fines for transgressions of these laws is more apparent when it is known that fourteen cases for possession of deer meat in closed season were made by deputies in December and twenty-two in January.

FIG. 47. Deputy C. H. Kunkel measuring Pismo clams to determine whether they are of legal size. Photograph by E. S. Cheney, November 26, 1928.

Soon after Deputy R. J. Tepper's transfer, he and Deputy Gyger secured the conviction of Charles Knight, Pine Knot, San Bernardino County, for killing a deer in a game refuge. Judge George R. Holbrook, of Ontario, fined the offender $500 and imposed a jail sentence of 50 days. The jail sentence and $250 of the fine were suspended, however, as this was the defendant's first offense.

Deputy J. H. Gyger, assisted by H. O. Langstaff arrested E. Forbes, of Corona, Riverside County, for killing a spiked buck and a doe; Judge H. C. Biggs, of Riverside, assessed a fine of $500.

The legal kill of deer in California amounts to some 20,000 a year and a

Deputy Fred Post, assisted by volunteer deputy Wells Lorenson, Salinas, Monterey County, arrested a hunter for killing a doe at night with the aid of a spotlight. Judge Harry J. King fined the violator, W. O. Kada, $500 and imposed an additional fine of $100 for night shooting.

Frank Chambers was apprehended by deputies Roy Anderson and Lee Atkinson on the Pierce Ranch, in Colusa County, for killing twenty-one ducks under the shelter of darkness. Judge George B. Reckers of Williams, Colusa County, sentenced the defendant to serve 100 days in the Colusa jail.

Because of the unfair advantage which may be taken of game at night, night shooting has become an outlawed practice. Eternal vigilance is still necessary to curb it. This is proven by the fact that during December, twenty-seven cases were made for night shooting and eleven in January.

Shooting from power boats is another methods which has been outlawed. Ten cases were made of this type in December and three in January.

The automobile is frequently employed by the violator and when this instrumentality is used with craft, apprehension is very often difficult. A practice commonly engaged in is where two individuals work together, one driving and the other doing the shooting. If a suspicious automobile or individual is sighted, the evidence is thrown out to be recovered later. Unless the deputy actually sees the shooting, it is almost impossible to make a binding arrest.

A fine of $300 was extracted by Judge Donald Younger, of Santa Cruz, from Joe Batich, of Watsonville, for selling ducks on the open market. The case is accredited to Deputy J. P. Vissiere and volunteer deputies Hans C. Struve and Fred S. Wing.

Charles Bishop, a waiter in the Louis Grill, Mason street, San Francisco, was fined by Judge Joseph M. Golden, $100 for selling ducks. Deputy Allan Curry and volunteer deputy C. Fluger made this case.

Records also show that twelve other cases were made during January for selling ducks.

Two cases are on record during December and one in January for over limits on geese; 13 in December of over limits on ducks.

Efforts to introduce the Chinese ring-necked pheasant in California will be barren of any satisfaction or success, if the nucleus of breeding stock planted in each area is persistently destroyed. Judge W. E. Everson, of Elk Grove, showed his sympathy for this thought when he fined William Brown $100 or a jail sentence of 50 days and fined Joe Jacinto $400 or a jail sentence of six months for killing three pheasants. The defendants were apprehended by deputies Nelson Poole and Charles Seibeck.

In southern California, deputies made seventeen arrests and convictions for excess limits of quail, during the first few days of the quail season. Before the end of the season, they made a total of twenty-two arrests and convictions for those who failed to stop when they had obtained the legal limit. Fines in the amount of $700 were imposed by judges, ranging from $25 to $75.

Protected non-game birds are used by some cooks to make a sauce. Robins seem to be chiefly prized. However, Cæsar Bruschera operating the Louis Fashion Restaurant at 524 Market street, San Francisco, is now probably of the opinion that a sauce which he made from robins in February was too expensive to be served in the future. Deputies Allan G. Curry and E. V. Moody were instrumental in securing his conviction and Judge Joseph M. Golden imposed a fine of $200.

Fifteen convictions were secured during December for killing and of possession of non-game birds; twenty-seven in January.

Records also show that four cases in December and two in January were made involving the killing of the protected band-tailed pigeon. Five offenders who killed whistling swans in January were also arrested and apprehended.

The spearing of salmon on spawning beds despoils breeding grounds and is altogether a very unwise use of the fish. Deputies are not unmindful of this and turned in three cases for salmon spearing in December.

In January, Captain Walter Sellmer and Deputy George Smalley brought an offender of the protection accorded to spawning salmon into the court of Judge Herman Rudolff of Novato. The fine was $200.

Bureau of Fish Culture

Mount Shasta Hatchery started the season with the following trout and salmon eggs and fry on hand: Loch Leven, 3,522,000; brown trout, 2,192,000; eastern brook trout, 753,000; king salmon, 907,000.

Eggs have continued to be shipped from this hatchery to the various stations through the state. Shipments to February 1, have totaled 2,600,000 Loch Leven trout; 400,000 brown trout; 500,000 eastern brook trout and 50,000 king salmon. Reports show that a high percentage of these eggs are hatching and

that the resulting fry are all in fine healthy condition.

The outlook for the coming planting season is not encouraging at this date, as the long cold spell and light rainfall have caused the fish to be unusually late, and the indications at present are for a light take of eggs.

In line with the policy established many years ago, eastern brook trout eggs have again been imported. 2,000,000 eggs have been secured from a private hatchery in Rhode Island, and shipped to the various hatcheries maintained by the division. Of this number 330,000 were allotted to Mt. Shasta Hatchery.

is at present in a very unfortunate condition and every effort to stock the Sacramento system has a bearing on this important problem.

Almost all the eggs in the Mount Whitney Hatchery have hatched. Gull Lake has not supplied this hatchery with the average number of eggs owing to the fact that the lake was overfished last season. So far it has yielded but 425,000 eastern brook trout eggs. To offset this, 100,000 eastern brook eggs have been sent from the Mount Shasta Hatchery together with 350,000 Loch Leven eggs.

Previous to the receiving of these eggs, the hatchery troughs were painted and placed in first class condition. The intakes were cleaned out and brush cut

FIG. 48. New exhibition display pond recently completed at Yosemite Hatchery. Photograph by Guy Tabler, November 19, 1928.

Through arrangements made with the state of Connecticut, 100,000 eastern brook eggs have been received. The Pennsylvania Game Commission has also been instrumental in securing for the division, 150,000 eggs, and 50,000 were received from Massachusetts. In reciprocation, 50,000 king salmon eggs were shipped to Massachusetts; 100,000 brown trout eggs to Connecticut, and 150,000 Loch Leven eggs to Pennsylvania.

After certain dangers to young fish had been removed in November, 1928, 305,000 king salmon were liberated in tributaries of the Sacramento River. The salmon run of the Sacramento River

away from the ditches and dam. Much sage brush around the hatchery was also removed.

At Fall Creek Hatchery, the king salmon fry are reported to be in good health and making a vigorous growth. All the eggs have been hatched and the older lots of fry began feeding in January. There were on hand at the close of January, 3,603,000 king salmon at this hatchery.

The run of fish to the egg-collecting stations located on Camp, Bogus, Hornbrook, Beaver and Shackelford creeks was delayed due to the very cold weather.

Only a few stragglers were taken in the early part of the season. As was expected, however, as soon as the water of these creeks warmed up a fair run resulted and several hundreds of fish were spawned.

Work on all these stations has been carried on to the end of making them efficient for operations this season. Obstructions have been removed, racks and traps kept clean and constant vigilance exercised to have everything in readiness.

During January 1929, 666,750 silver salmon eggs were shipped from prairie Creek Station to the Fort Seward Hatchery.

Prairie Creek contains 62,300 Chinook salmon fry, 45,500 steelhead trout and 63,550 cutthroat trout. Tanks have been built at the Prairie Creek Station for holding Atlantic salmon. These tanks are 32′ x 48′ x 16″.

Rainfall was below normal and the run of steelhead trout was late.

Scott Creek Egg-collecting Station is anticipating a good run of steelhead and salmon. A constant patrol was kept along this fish refuge, but due to the fact that few fish began running, only 37 steelhead and 319 salmon were taken up to the end of January.

The 298,000 silver salmon fry in the Brookdale Hatchery are reported to be in good condition.

Fingerlings being aged at the San Gabriel Station are showing a good growth. As these fish range in size from three to five inches during January, 1320 were planted in the waters close to the station. More were planted in February to avoid overcrowding. The object of planting at this time is to encourage the fish to scatter thus avoiding concentration, making possible catches of large numbers shortly after the season opens.

The fish at the Feather River Hatchery are lively and making favorable growth. These have been developed from eggs shipped from the Mount Shasta Hatchery and comprise 250,000 eastern brook trout and 250,000 Loch Leven trout eggs.

Due to the educational aspects of the Yosemite Hatchery the regular work has been varied with care of the trout in the aquaria and in the exhibition pond.

The 48,950 brown trout in the holding pond, 151,000 eastern brook trout (Rhode Island) eggs and fry, and 148,000 Loch Leven trout eggs are reported to be in good condition.

Feeding the eastern brook fry at the Tahoe Hatchery was commenced during the latter days of January. At that time this hatchery contained 600,000 of this variety, together with 100,000 Loch Leven trout fry.

Most of the 250,000 Loch Leven trout eggs at the Mormon Creek Hatchery hatched by January 27, 1929. Some 132,740 eastern brook (Rhode Island) trout fry are also swimming in the troughs of this hatchery.

The 199,255 eastern brook eggs in the Kaweah Hatchery were all hatched by January and the 98,395 Loch Leven eggs developed rapidly.

Decision has been made to locate a permanent hatchery on the Kings River and to supply Fresno County and those areas immediately adjacent to this country. This will avoid the long rail and truck trips and will insure less loss when fry need to be transported by pack animals to the High Sierran lakes and streams of Fresno and Tulare counties, where large numbers of people spend their summer vacations.

The temporary dam 1½ miles below the junction of the north and south forks of the Kings River has been abandoned, since it was too frail to withstand the high water during the winter and spring. Work on the new diverting dam commenced on November 8, 1928. This dam is 200 feet long, of the rock-filled crib type and has a spillway forty feet wide in the center. It will raise the water level and permit the conveyance of water by means of a pipe line to a flat where the permanent hatchery will be located. At present the old tent frame, troughs, tanks and the like have been erected on this new site pending the coming season's operations.

The principal biological work has involved the study of food formulas. A plan of feeding four different formulas at different hatcheries to different varieties of fish has been worked out.

A study has been made of the fin and tail disease and emphasis placed, not so

much on control measures, as on methods of prevention.

Bacterial tests have been made of samples of eggs imported by private fish hatcheries. But so far no pathogenic species of bacteria has been discovered.

A biological study of the fish and fish food available in the Salton Sea has been inaugurated in order to determine the possibility of introducing fish into these waters. Special attention will be given to the varieties of fish now present in the Salton Sea and changes in topographic conditions, salinity of the water, absence or abundance of algae, plankton, crustacea and insect fauna will also be observed.

Bureau of Commercial Fisheries

Live Pismo clams and abalones, both green and black, were shipped to the Hawaiian Islands in November. This was made possible through an arrangement between the Division and I. H. Wilson, fish-culturist of the Division of Fish and Game of the Territory of Hawaii. This experiment is the result of a determination made by the Hawaiian commission to ascertain the possibilities of introducing these valuable sea foods in the islands.

Due to the fact that immature salmon are caught by trolling early in the season, efforts are being made to coordinate the regulatory measures being taken by the three Pacific coast states to bring about a uniform control of this phase of the fishery. Oregon proposes to introduce a bill in its present legislature to limit the trolling season for salmon to July, August and September. A representative of the Fish Commission of Oregon, Carl Shoemaker, during a recent conference with the Bureau, urged that California coordinate its legislation along this line with Oregon. The cooperation of the state of Washington is likewise being sought.

Theodore H. Scheffer, representing the United States Biological Survey, stationed at Puyallup, Washington, during a recent visit, complained of the indiscriminate killing of seals and sea lions along the Pacific Coast.

A few tuna and skipjack were landed at San Diego in January. The fishing at Cape San Lucas, however, has not gotten under way and most of the fish landed were catches made by bait boats working out of San Diego.

A hydrobiological survey of Monterey Bay has been undertaken by the Hopkins Marine Station, assisted by the Division of Fish and Game. The work is under the direction of Dr. Tage Skogsberg of the Hopkins Marine Station. He is assisted by E. C. Scofield of the division. The patrol boat *Steelhead* is being used for this survey and has been equipped with a winch and cable for the handling of trawls and deep sea instruments.

Three fish bulletins have been completed for publication, one a "Report on the Seals and Sea Lions" by Paul Bonnot, the other two by the staff of the State Fisheries Laboratory. One of these, "The Commercial Fish Catch of California for the Years 1926-1927," shows tables of monthly catches, picturing in graphic form the outstanding feature of yearly catch records. The other bulletin deals with the life history of the jack smelt.

Another bulletin, in the course of preparation, is on the commercial fishes of the State. It will have photographs and popular descriptions of all the important commercial fishes.

Other work being carried on by the laboratory staff has to do with the development of sardine eggs to throw light on spawning habits.

A boat catch analysis of the striped bass of the Sacramento-San Joaquin river system is being made. This will include the relationship of striped bass to shad and salmon catches.

General patrol work has been carried on at the various centers of the commercial fishing industry. At Pittsburg, Deputy L. G. Van Vorhis has been active in sardine cannery inspection and has assisted the river patrol in an attempt to run down certain persistent striped bass law violators.

On December 5 Deputy Paul Bonnot arrested K. Katawa of the Main Fish Market, Lodi, for violation of the Fishing Data Act. The defendant was charged with buying fish without making proper record in his fish receipt book. Judge J. H. Clancy, at Acampo, San Joaquin County, fined him $100.

H. Shinozaki was also arrested by Deputy Bonnot at Walnut Grove for the same offense, and was fined $100 by

Judge W. E. Everson at Elk Grove, Sacramento County.

At Monterey, Captain Ralph Classic and his assistants have been carrying on the regular work of checking canneries and general fisheries patrol about the Monterey district.

Deputy N. C. Kunkel has made a number of good cases at Pismo Beach, San Luis Obispo County, and has the clam and abalone situation well in hand. Good work has been done by cooperating with the deputies under Captain S. H. Lyons of the regular patrol.

Captain C. H. Groat and his men have concentrated their attention on the San Pedro sardine packers and, besides checking the plants, have kept a watchful eye open for violations in their entire district. Several cases were made on purse seine and lampara nets, and the possession of nets in the closed district around Catalina Island.

Bureau of Education and Research

Dr. H. C. Bryant, while attending the National Game Conference, at New York, enjoyed the opportunity of meeting the principal leaders in conservation and in gaining first hand knowledge of the most progressive ideas and methods. Further side lights on methods of wild life production and protection were obtained during visits to the Federal Bureau of Fisheries and the Bureau of Biological Survey, from officials of the Pennsylvania Game Commission, at Harrisburg, and other institutions visited.

On the evening of December 3, 1928, two recent reels of the Division were shown to those in attendance at the Conference. The mountain sheep and antelope picture, as well as that on shore birds, received much comment of a praiseworthy nature.

The chief of the bureau has attended a number of the meetings of the California Economic Research Council and is serving in the capacity of member on the Natural Resources Committee.

The problem under present discussion is centered in the need for topographical maps of the state. The federal government will be urged to complete the series of California maps.

Opportunity has again been afforded for broadcasting over KGO worthwhile information on game and nongame birds and their protection. In particular, the status of the quail of California has been emphasized.

During January and February a variety of specimens received the attention of the laboratory conducted by Dr. H. Van Roekel at the Hooper Foundation for Medical Research.

Considerable deer trouble was reported, but the reports from different sources do not agree as to the seriousness of the trouble. However, judging from the observations reported and the specimens examined, the mortality is largely due to parasitism. The mortality is greatest among young deer. Communications with Dr. Iverson, state veterinarian, reveal that domestic live stock in the affected district are parasitized with similar parasites as found in the deer examined at this laboratory. Veterinarians in the affected locality expressed their view that the losses among deer were due to parasites. The following parasites were found in large numbers: Oestrus larvae in the nasal passage; lung worms; oesophagostoma in the cecum and colon; setaria labiatopatillosa in the peritoneal cavity. Since decomposition is so far advanced in specimens when they arrive at the laboratory, plans are being made to examine fresh specimens in the field. A general and intensive survey will be made concerning the mortality of the deer.

Five blind deer were reported near Alturas; two affected deer heads were submitted to the laboratory for examination, but no definite cause was arrived at for the total blindness.

Reports on the duck sickness at Hollywood Duck Club, near Delano, were received January 15. An acute flare-up was observed on January 14, at which time more sick ducks were observed than any time previous during the course of the season. Weather conditions were reported as follows: cold and foggy, with little or no rain for a month. Game wardens were requested to send sick birds to the laboratory. Five sick birds were received for examination. The ponds in that locality are being drained since the close of the season, and few ducks are present.

Further feeding experiments relative to the duck disease investigations were conducted during January.

Five dead mud-hens from Coalinga were received for examination and found infested with flukes. Two pin-tail ducks were received, one of which died from an impacted crop and the other was unfit for examination.

From a game breeder at San Jose one quail was received which was infected with blackhead and crop worm.

The domestic poultry at the game farm were retested for tuberculosis and bacillary white diarrhea. But .54 per cent infection of the latter disease were found, while 7.44 per cent of the birds were infected with tuberculosis. It is hoped that these two diseases may be eradicated from the flock during the summer by repeated tests. Ten quail introduced onto the farm recently showed signs of disease. Blood examinations were made for haemoproteus by E. C. O'Roke, but found negative. Four of the surviving birds were killed and examined, all of which were infested with a capillarid that attacks the crop lining and anterior portion of the duodinum. One sick female Reeves pheasant was killed and examined and found to be infested with air-sac mites. Proper facilities and equipment are gradually being established which will make possible the institution of practical and effective sanitation.

During the last month five different specimens of fish eggs were submitted to the laboratory for bacteriological examination. No organisms pathogenic to fish were isolated. Two reports of mortality among fish in hatcheries were received. Diseased specimens from these hatcheries revealed that the malady is different from those of the past. Further study is necessary before any definite information can be given.

Considering the various disease conditions in materials which were submitted to this laboratory for examination, it is evident that this field merits the attention it is receiving. During the next few months the time and effort will be largely directed to the State Game Farm and the state fish hatcheries so that no disease epizootics can gain a foothold.

E. S. Cheney has secured additional motion picture film of tidewater fishing for steelhead and striped bass. Several feet of film were taken of salmon spawning in a coastal stream. Some good material was obtained of goose hunting in Lassen County, and of the annual census of Pismo clams made by the staff of the Commercial Fisheries Laboratory. As a climax to this quarter's work, a splendid film has been obtained of the antelope on winter range in the Mt. Dome section, Siskiyou County. This, together with the pictures of these rare game mammals secured in Lassen County, completes and rounds out the division's film on this subject.

Dr. H. Van Roekel and E. S. Cheney edited and titled a film shown for the first time at the Fourth Annual Convention, entitled "Duck Disease Investigations." Rodney S. Ellsworth and E. S. Cheney edited and revised a film on the "Deer of California." This, together with three reels depicting various phases of the division's activities was assembled and also shown.

Cutting and titling of the motion pictures soon to be issued on the spiny lobster, Pismo clam and commercial fisheries patrol is well under way.

All negative in possession of the division has been segregated according to suitable subject, sealed in cans and treated to prevent deterioration.

Requests for loans of motion picture films has increased and shows that the library of films is being put to a continual use.

The demand for lectures has not abated. Dr. H. C. Bryant gave lectures in Los Angeles County in February and paid a visit to Lancaster and Palmdale in answer to an insistent request.

In December Rodney S. Ellsworth covered the principal farm bureau centers in Lassen County and had an opportunity of stressing the importance of adequate protection and respect for game resources in a county where game abounds and where residents are daily in intimate contact with wild life.

Donald McLean investigated the damage to irrigation ditches caused by muskrats, beavers and rodents in the Imperial Valley during December. Considerable complaint has been made of damage done and harmful effects resulting from the work of these rodents. In an effort to control them, the irrigation company has been paying a bounty of 25 cents on the tails of all muskrats brought in. Many requests for special permits for trapping these animals have reached the division.

Research on the natural history of quail is advancing. In January McLean commenced to investigate the quail situation in the Spring Valley Water Company's property in San Mateo County. Quail were especially abundant in this area in former times, when it represented one of the centers of quail population. Quail seem, however, to be on the decrease at the present time, in spite of the fact that hunters have been excluded and predatory animal control has been practiced.

Sixty magazines, popular, scientific and otherwise are received by the library each month. Many of these are publications

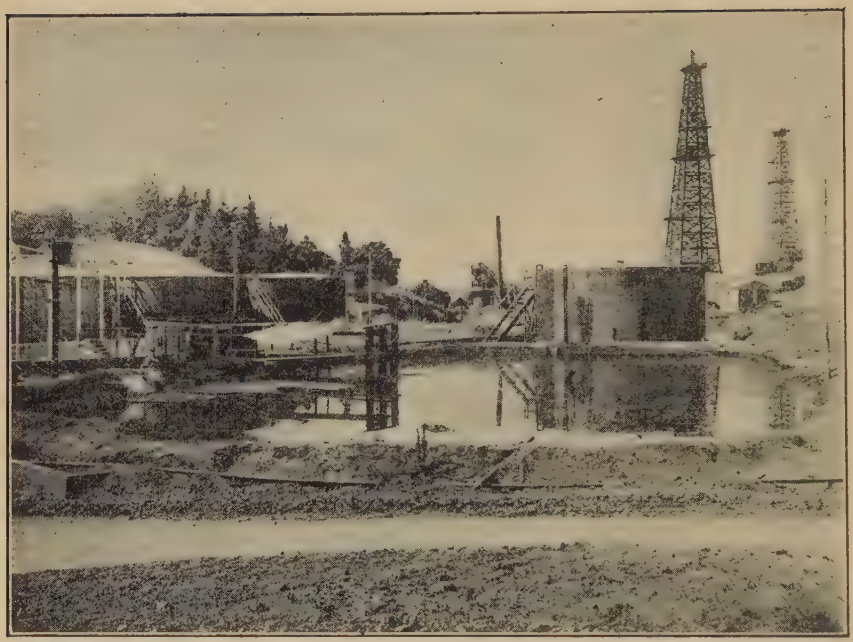

FIG. 49. Old type of individual oil sump with earth levees formerly used in preventing oil pollution.

FIG. 50. New type of sump. Part of a cooperative reclaiming system costing about $300,000 which is now in operation in southern California. By such prevention measures, the various oil companies are aiding in preventing pollution of state waters.

from other states, sporting clubs and conservation organizations. A plan is under way to make them available and useful to the field force.

Many important accessions have been made.

Bureau of Public Relations

During the three-month period, preparation of publicity, attendance at two hearings in the Monterey sardine cases, routine office work and trips to Eureka and various sections have occupied the time of the chief of the bureau.

Acting as one of a committee of three to arrange for the Fourth Annual Convention of Employees of the Division which was held on February 13, 14 and 15, much work was found to be done. The arrangements for the final day's barbecue was a man-sized job, but thanks to an efficient "K. P." force, and beautiful weather, this event was carried through without a hitch.

During the convention a daily bulletin of events was published, the "news" being handled before and after the sessions, and the bulletins distributed before the session closed each day.

Attendance at the three-day trial of the cases against three Monterey sardine canners at Salinas, Monterey County, was an interesting and busy session. Each day the story of the trial was "covered" for the Salinas *Daily Index-Journal.* The story was handled in regular metropolitan style, that is, new leads were furnished at the end of both morning and afternoon sessions. The managing editor, Rollin G. Watkins, saw to it that the division's side of the case was impartially handled, giving the real news of the trial.

Bureau of Hydraulics

A self-cleaning parallel steel bar screen has been invented by Francis Cuttle of Riverside. This device is primarily constructed to remove trash and drift from ditches, but works also as an effective fish stop. It will take care of ditches practically any width and four or five feet in depth.

An important installation of fish ladders on the upper and lower Twin Lakes in Mono County occurred during the month of January. The bureau has worked on this problem since 1926. The installation is the result of a hearing and a number of conferences.

The next migration of fish up the Walker River will determine the effectiveness of a ditch constructed around the irrigation district dam just below Bridgeport, Mono County. It is expected that this "run around" will serve the purposes of a fish ladder and will permit fish to get above the district dam.

A 10,000 gallon tank and gravel filter has been installed by the Model Laundry Company at Susanville, Lassen County. This equipment will clean the laundry water and, it is anticipated, rid it of all substances deleterious to fish life before it enters Piute Creek.

The Kern River Canal and Irrigation Company has installed a parallel bar screen across a canal seven feet in depth and forty feet wide.

A parallel bar screen has also been installed by the Farmer Stine and Anderson Canal companies on a jointly owned canal in Kern County.

The Kern Island Canal Company has also installed a parallel bar screen.

The Townsend Flat Water Ditch Company has installed a fish ladder which will permit fish to pass its Clear Creek dam in Shasta County. Records show that this dam has been an obstruction to migrating fish for many years.

United States Army engineers have reconstructed the fishway at Daguerre Point Dam on the Yuba River, Sutter County. The approach to the fishway has been improved by blasting away the rocks. This should render it more effective.

On the whole, the army engineers have displayed a real interest in conserving fish life and have been sincere in their endeavors to improve conditions.

Reports received from Lassen County show that five fish ladders have been repaired and placed in a proper operating condition.

An inspection trip in Trinity County shows that two fish ladders have recently been constructed and accepted by the division.

The Clover Valley Lumber Company has reinstalled a good fish ladder over the dam maintained by that company on Grizzly Creek, Plumas County.

The Walker Mining Company, operating in Plumas County, has constructed dams and by-passes which will prevent pollution from its mine operations.

Oil fields near Bakersfield have been inspected. A sump costing some $63,000 is being jointly used by operators in this field and this will, no doubt, minimize possible pollution of the Kern River.

In general, conditions in the southern California oil fields are good. Very little pollution is now occurring.

Bureau of Lands and Game Refuges

Game census reports are revealing very interesting information on the fluctuations in game conditions throughout the state.

This season, quail were reported to be very plentiful. For instance, an observer at Redlands writes that "in some sections all of the desert abounds with both mountain and valley quail." Another report from the Jawbone Canyon and Kelso Valley districts, San Bernardino County, evinces the prevalence of quail in this section. Proof of this is borne out by the fact that deputies checked 336 licenses of quail hunters and 2,305 quail were killed the first two days of the season. Twelve limits and six near limits were checked in San Diego County by one individual.

The governor's committee on Game Refuges and Public Shooting Grounds has taken a deep interest in their work. Tentative areas have been selected in the San Joaquin and Sacramento valleys, the heart of the waterfowl country, and its recommendations that the commission consider these areas will be submitted shortly for final action.

The committee is apprehensive that conditions have varied greatly in California during the past fifty years and realizes the immediate need for providing adequate feeding and nesting grounds for migratory waterfowl.

A list of shooting clubs together with the area owned or leased and their relative efficacy in attracting ducks is being compiled. This work is being carried on through the field forces.

Jay Bruce operated in southern California in February and March because conditions at this time of year are most favorable for lion hunting. During the period between October and January he was successful in bagging nine lions. He secured these in game refuge 1-J, Amador County, the Ice House country above Riverton, El Dorado County, Dorrington and Buck Ranch, Calaveras County and Grizzly Canyon, Santa Clara County.

In January, six lions were added to his credit. Two others were captured alive, one being a thirty-pound and the other a fifteen-pound kitten. Operations during this month were conducted in Santa Clara and Monterey counties.

Bureau of Game Farms

The 1928 distribution sheet shows that 6106* Chinese ringnecked pheasants were liberated in suitable locations throughout the state. Some 200 California valley quail were planted, as well as 125 Mexican bronze turkeys. Forty Hungarian partridges were liberated in Squaw Valley, Fresno County, and seventy-two display varieties of pheasants presented to city parks. In all, 6543 birds were sent out. These have a market value estimated at $18,650.

The year started at the Yountville Game Farm with 995 Chinese ring-necked pheasants which will serve largely as breeding stock for the present season. There were still to be disposed of, fifty-four wild turkeys. A large number of the sixty-one valley quail were retained for further experimental purposes, both in disease and in propagation. Further propagation experiments will be carried on with thirty-five Hungarian partridges. Of the show varieties of pheasants, the stock on hand consisted of 53 silver, 27 golden, 12 Mongolian ring-necked, 12 Reeves pheasants and one Lady Amherst pheasant.

The turkey pullets began laying February 19. Last year the first eggs were gathered on February 20. This indicates that these birds are regular and dependable. The first pheasant eggs were gathered March 9 and 10. In each instance, it seems to be the pullets that first begin to lay.

The problem of quail administration is one, not so much of artificially producing

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* See p. 184 for further details of these plantings.

individuals, as it is of taking care of the breeding stock already on hand in the natural habitat. Two recent instances where private individuals have established quail sanctuaries throw much light on this thought. They are suggestive of the good that can come where property owners are willing to cooperate with the division and allow their lands to be used, not only as places where birds may be trapped and transported to localities where they are needed, but also as areas where a breeding stock is safe-guarded, which serves as a natural center of dispersal for the surrounding area.

Last year over 650 quail were liberated in the Point Loma district at the request of landowners. Thousands are reported there now. The D. D. Wilder's estate, in Santa Cruz County, and the Clary Brothers ranch in Coachella Valley, in Riverside County, have been closed for a number of years and quail have multiplied amazingly. These places have ideal natural surroundings and are most suitable for permanent quail refuges. Thousands of birds can be reared each year at practically little cost.

In December, 1928, 100 California valley quail were sent to the Wilder estate for stocking purposes. The report of their liberation is worth quoting in part and is as follows:

"The birds arrived in fine condition, and we took two crates up a gully near the center of the ranch, where there is brush, trees and a running stream. We placed a crate near a good place, opened the door and stood back to watch. In just a few minutes, the birds in the crate commenced calling and the home birds answered. Soon the birds started coming out of the crate, one and two at a time. These started to feed and to call until the whole countryside was in an uproar. Those in the crate on the truck joined in the calls. We got such a thrill we sent back to the house for two more crates. We have not enjoyed anything so much for a long time."

The interest in wild turkeys is increasing judging from the number of inquiries and requests for information on rearing them. The plan of supplying a breeding stock to interested owners of suitable protected areas, instead of thousands of immature birds for liberation, has proved to be the most efficient policy. By having a number of selected localities in different parts of the state rearing and releasing young turkeys, it may be possible within a short space of years to have good turkey shooting. Sportsmen's organizations are already showing a lively interest in this program. In particular, the Santa Barbara County organization is undertaking the rearing of turkeys. Stock was furnished them. Redding is another section that offered to help. So have the owners of the Hofschneider ranch in Sonora, Tuolumne County, of the W. J. Wallace ranch, Delano, Kern County and the Allen G. Hancock place, Santa Maria, Santa Barbara County.

Five turkeys were shipped from San Francisco on January 8, 1929, for the long thirty-five day ocean trip to the Argentine Republic. Through an arrangement made by George O'Connor, these birds were sent in exchange for additional varieties of the South American game bird, the tinamou.

A pair of golden and of silver pheasants were forwarded to the Governor of Arizona, George W. P. Hunt, during the first week of December. This shipment represented a token of appreciation for the part Arizona has played in supplying California with a breeding stock of turkeys.

Another exchange of six versi-colored pheasants was made in November with the Washington State Game Farm for a two-year old male Reeves pheasant which now gives four complete breeding pairs of these birds. This will permit the rearing of a sufficient number of these birds to attempt their introduction in some of the higher altitudes of the state.

Thirty ring-necked pheasants have also been presented to the Jordan Game Farm in return for the chukor partridge. This bird has a wide distribution in western and central Asia under the name of Greek partridge. It has a reputation of being able to exist on the hottest and most barren of hillsides. It can not stand a situation of unbroken dampness, where the forest is dense and the rainfall great. It is anticipated that this bird may solve the partridge problem, due to its possibilities as a domestic breeder.

In February, 1929, a number of Chinese and silver pheasants, Hungarian and bamboo partridges were delivered to the Golden Gate Park aviary. An interesting experiment will be carried out to determine whether the two varieties of partridge will do better when given the liberty of a large pen. In return, other varieties of game birds were received at the farm and it is hoped that this new blood will improve the stock now on hand.

Goat Island, in San Francisco Bay, has become a refuge and received a plant of Chinese ring-necked, silver and golden pheasants and California valley quail. This plan is in line with the policy to supply parks with game birds for educational exhibits. Already parks located at Eureka, Napa, San Francisco, Santa Cruz, Fresno, Merced, Bakersfield, Santa Maria and Los Angeles have been supplied.

In the past two years, over 700 song and other non-game birds that spend their winters in the vicinity of the game farm have been banded. This winter many birds, previously banded on the farm, returned and the percentage was, indeed, quite high. Many of the banded birds are reported to nest as far north as Alaska.

Living conditions for the attendants have been greatly improved by the addition of a recreation room, another bed room, and a shower room having hot and cold running water.

Concrete floors have been placed in the domestic poultry houses. In other ways, these structures have been improved so that they now conform with the best ideas of poultry men.

Plans for electric incubation and brooding for the coming season are going forward satisfactorily. A few minor changes have been made, based on last year's experiments in breeding bantams. More ventilation and moisture is needed in incubating game bird eggs and the incubators are being adjusted to meet this need.

Arrangements were made with the Hooper Foundation and the Bureau of Education and Research to test again all domestic hens used during the present season as foster mothers. Last fall, Dr. H. Van Roekel tested the bantam hens from which a hatch of over 800 chicks in electric brooders was obtained. Ninety-eight per cent of these were raised. This is evident proof that a clean brooding stock is of value.

The breeding stock of pheasants and quail may also be tested. So far, however, no blood infection has been found in pheasants, as it has been found in quail.

COMMERCIAL FISHERY NOTES

N. B. Scofield, Editor.

ALBACORE IMPORTED FROM JAPAN

In 1927 a new source of supply was established when approximately 78,000 pounds of albacore were imported from Japan as an experiment and canned in the southern California plants. The Orientals prefer the darker meated varieties and for this reason the white meat of the albacore sold low enough to permit a trial shipment in ice to be made to the tuna canneries in southern California. The experiment proved successful and during the first six months of 1928 approximately 4,000,000 pounds were imported from Japan, while in June and August 20,000 pounds of albacore were brought from the Hawaiian Islands.

The tuna canning industry is becoming yearly more dependent on the supply of fish obtainable from distant fishing grounds and especially those to the south in Mexican territorial and extraterritorial waters and on the yet undeveloped marine regions even farther south along the coast of the mainland of Mexico and beyond the Socorro Islands in the Pacific. In the near future it is possible this fishery will be extended even to the waters of Central America. Boat building concerns in southern California are even now drawing plans for steel and wooden framed refrigerated fishing boats of sufficient size, fuel and water carrying capacity, to make the longer trips.

It is, therefore, to the best interests of both the United States and Mexico to closely cooperate in solving the problems of protection and wise use of the fisheries: The United States to protect a food supply for her people and a California industry involving large investments and the employment of many citizens, from failure through depletion of the desirable species or unreasonable duty requirements by other countries; Mexico to protect her marine life, to continue to hold the market for her unused raw materials and to assure the continued collection of revenue from her natural resources.

CONDITIONS IN THE SARDINE FISHERY AT SAN PEDRO

An investigation of conditions in the sardine fishery at San Pedro shows that sardines received the latter part of August, 1928, were in good condition. Those received during November and December were in poor condition. In fact, were probably not in as good condition as those received in November of the preceding year. The reason given for this is that no local fish were caught during November and December, 1928. All the sardines came from Santa Cruz Island, San Nicholas Island and Osborne banks, in general, some eighty miles distant from the canneries. There was a good deal of rough water during November, and the weather was quite warm. The long haul under such conditions spoiled a good many of the fish. It is stated that the fishermen would catch a part of the load one day and wait over until the next day to fill out the load. The canners complained to the Division's inspectors that these loads would have good fish only on top and they would find that a large part of the load had to go into the reduction plant.

Another explanation for this poor condition is that the sardines were caught with purse seines. These are operated by larger boats than employed by ordinary lámpara seining outfit, commonly employed in seining sardines. Purse seine boats, furthermore, are not properly fitted to carry sardines long distances. The fish are put into the hold and many are crushed by the weight of a large mass of others on top. If the water is rough, they are badly mashed. This condition is made much worse when the weather is warm.

If purse seine boats are to be used to catch sardines for the cannery, they should be better equipped to take care of the fish. Certainly, the canners should require that the sardines be delivered to them in good condition.

TUNA PACKING IN TUNIS[1]

African Cannery Methods—Preparation of Fancy Stock

California tuna packers will find interest in an account of methods and processes employed by competitive canners of their product operating in Africa. The Spanish *Boletín de Pescas* has reviewed[2] investigation work undertaken by Professor A. Gruvel, who has reported his

[1] Contribution No. 80 from the California State Fisheries Laboratory, January, 1929.
[2] September, 1928.

findings in the bulletin of the *Station Oceanographique de Salammbo.* His treatise is broad in scope, and deals in detail with the extraordinary number of differing gears, nets, traps, and diving apparatus used in the varied fisheries of the Tunis coast. To the fishing come Spanish two-boat trawlers, Italian round haul seiners, English otter board outfits equipped with Vigneron-Dahl patented tackle. Maltese in their high-prowed sloops bent on sponge fishing, Sicilian net men, coral dredgers, squid jiggers, seiners of a dozen sorts, and gangs of native workers busy at building great floating traps, set nets, and tuna weirs. Professor Gruvel tells of the English steam trawler; he notes the tendency of the sailing *balancellas* to install oil engines; he describes the clipper bowed drag boats, square sailed and with triangular jib, "Sicilian in type but manned by Italians"; the fast sailing *corallines*, lateen rigged, thronged with coral divers; the little canottos, fifty footers, painted in brilliant colors. "And every one of these groups specializes in some particular fishery," he says.

Following a consideration of the vessel types, Professor Gruvel discusses the apparatus of capture which, he says, "presents as great a variety as in the case of the boats." Two-boat drag nets, otter board gear, beam trawls, bagless drag nets, sweep gear that is shoal, and tangle bars and dredges for sponges and coral, commence his list. He discusses squid lure, anchovy seines, artificial baits; he tells of setting empty pots as traps for octopus, and finally pictures the great stationary tuna weirs and traps for which the region is world-famous.

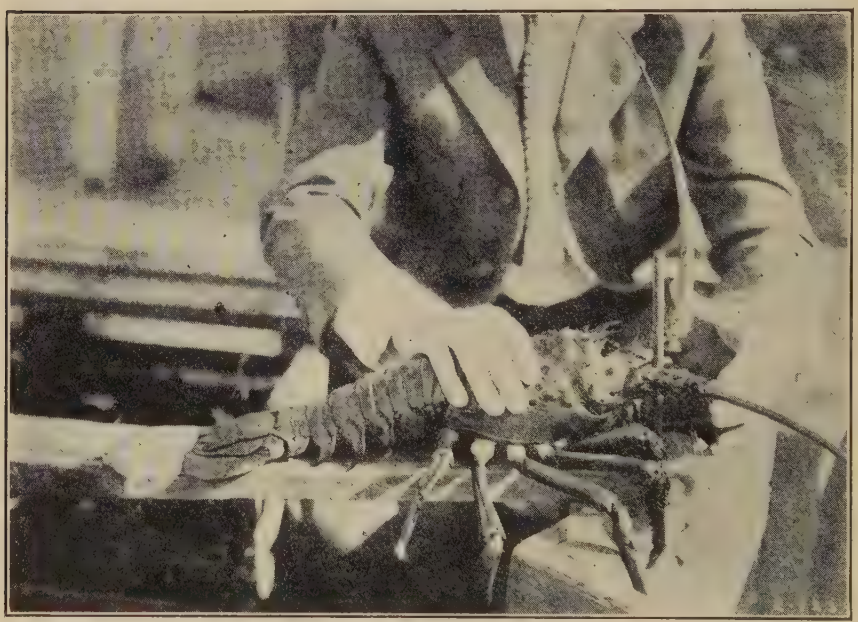

FIG. 51. Deputy measuring spiny lobsters in the San Diego markets to determine whether they are of legal size. The spiny lobster is one of the only fishery products that has the distinction of both a maximum and minimum size limit. A legal spiny lobster is not less than 10½ inches nor more than 16 inches in length. Photograph by E. S. Cheney, November 2, 1928.

"The tuna captured are taken ashore aboard scows towed by a small tug, and inside the factory are beheaded, eviscerated, and hung by the tail until the next day, to bleed them. Great care is taken in separating the spawn, which is used to make *poutargue.*

"When well bled the tuna are cut up, the pieces being carefully washed before proceeding to cook them in kettles containing water of 35 degrees salinity, Baumé scale.

"From the boilers the meat pieces are deposited upon a framework of cane to cool and drain.

"The pieces of tuna, cold and well drained, pass to the packing room; the cans are then filled with olive oil and finally sealed and sterilized.

"A part of the meat is treated by salting only. The scraps remaining are utilized in the manufacture of guano and oil.

"The roes of the mature tuna are salted upon a board from seven to eight meters long and slightly concave; they are afterwards washed in sea water and arranged on a new board, covered in turn by another board which bears its own burden of roes, and so on successively. To press them stones are placed upon them, and after this operation, they are dried in the open air, thus forming the product called *poutargue*."

This dry "tuna caviar" is said to be in ready demand at handsome figures, and contributes an appreciable profit to the African tuna business as a whole.—Geo. Roger Chute.

NIGHT FISHING WITH LIGHTS ON THE COAST OF AFRICA[1]

An Italian Method, Long Proven Effective

Veteran fishermen of California sardine experience tell that in former times the seining of pilchards was a daylight operation. Monterey was the seat of the then infant industry, and the netting crews rowed out from shore of a morning to catch stock for the canner's use next day.

Actually, the first fishing was done with gill nets, but the obvious difficulties in the way of hand picking from tangled twine enough sardines to busy a cannery throughout a day soon compelled a change in the mode of capture, and the adoption of the purse seine. As has been said, the pursing gear was at first employed only in daylight hours, and therefore was not so successful as to satisfy its users. Accordingly in 1905, a progressive fisherman of European experience induced the operators to import an Italian gear. This foreign apparatus was so productive that it has since become common to all our ports, being known as the "lámpara net" or "lámpara." Indeed, its popularity became so great that it expanded to the practical extinction of the pursing gear. But a few years later northern fishermen, migrating southward, reintroduced the purse seine net, and by some modifications in the former methods of working it, made their favorite tackle so effective that it has grown to be the dominant harvesting apparatus.

Both the "lámpara" and the purse seine are night nets; only for comparatively brief periods are they now used for daylight fishing. Seining operations conducted during hours of darkness are the present support of the industry.

But our sardine netting is done in utter darkness. Boats cruising the grounds show nothing but the minimum running lights prescribed by law. Not until the net is cast and hauling commences are deck lights of any sort displayed. It is interesting, therefore, to read that in the Mediterranean Sea an entirely dissimilar plan is used successfully and that there the sardine fishing is done at night also, but with the use of powerful illuminators to attract the fish.

In the September, 1928, issue of the *Boletín de Pescas*, official organ of the Spanish Institute of Oceanography, there appeared a review of certain fishery investigation conducted by the French in Argelia, Africa.

"The Director of the Laboratory of Castiglione,"[2] writes the Spanish editor, "is dedicating an extensive work to the methodical study of fishing with lights on the coast of Argelia. . . .

"In Argelia night fishing with lights was subjected to regulation in 1926, when it was authorized in depths greater than fifty meters, provided that at least five hundred meters distance separated it from any other fishing apparatus; and that if these others were the set nets or fixed gear called *almadrabas* or *almadrabillas* (the great Mediterranean tuna traps or pounds) and closed zone was increased to one kilometer.

"The 1926 regulation permits the carrying of only enough carbide for supplying the lamps. Also it forbids the use of lights submerged below the surface of the water, and authorizes the capture only of sardines, alatxa (a sardine-like fish), horse mackerel and other species of pelagic habits.

"As a preamble to his personal observations he gives a synopsis of the opinions of French and foreign investigators, all of whom are of accord in that fishing with lights, properly regulated, can be made to yield good returns. Professor Boutan sets forth in short paragraphs the estimates of the different authorities consulted:

[1] Contribution No. 79 from the California State Fisheries Laboratory, January, 1929.

[2] Louis Boutan. "La pêche au feu sur les côtes d'Algérie et le transport du poisson bleu dans l'intérieur de l'Algérie." Station d'Agriculture et de pêche de Castiglione, 1927, primer fascículo.

'The only charge against this form of fishing is an argument in its favor; it is accused of too great efficiency, of permitting too abundant catches,' writes Dr. Fage.

'The fishery-with-light is a fountain of riches for Spain,' says Professor Odón de Buen.

'The fishing based upon the use of lights seems not to have produced any depletion in the coastal fishery,' says Professor Fédel.

'Fishing with lights, which has been carried on for more than thirty years in Italy, beyond doubt increases the quantity of fish captured from among the migratory species,' says Professor Sanzo.

'The quantity of fish caught each year indicates, with some variances, that the product of the fishery tends to increase rather than to decrease along the coasts of Sicily,' writes Professor Russo.

"On the coasts of Argel they do not always fish with the same number of boats and oil-burning lamps for producing light. They may employ three boats, each of which has one lamp; they may use two vessels operating in conjunction with a third acting as light carrier, or, in the third case, they may work with only one craft having with it an auxiliary boat of small size, this latter being charged with the business of illuminating the water to attract the fish."

In this general connection it is of interest to note that the Spanish word for "lamp" is "lámpara," the same that is used by us as the name for the Mediterranean sardine net now employed throughout our domestic fishery. It is, therefore, the "lamp net." The Italian word for lamp is "lámpada," so it may be that their calling the net by the Spanish name is a direct adopting from that language, it being a fact generally admitted that many fishing appliances found in south European waters were originally of Spanish invention.

Americans habitually mispronounce the word "lámpara" and few if any have a correct notion of what meaning the name may have. But by combining the facts that sardine night fishing in the Mediterranean is done with lights, and that the gear we obtained from those waters is still known to us by the foreign name meaning "lamp net," it seems quite probable that we in America are now using, in our unlit night fishery for sardines, the same "lámpara" or "lamp net" now employed on the coast of Africa for fishing with torches or brilliant carbide burners to toll up and dazzle the schools of fish.—George Roger Chute.

LIFE HISTORY NOTES

PRONG-HORNED ANTELOPE IN CALIFORNIA

In pursuit of bird and animal films for the State Fish and Game Commission I have had very close contact with the antelope situation in northern California at various seasons during the last two years.

I find conditions in Siskiyou County are the most promising, and the bands ranging in the Mt. Dome section at this time are in better condition than those in any other place I have visited. There are but few, if any, sheep grazed in this section, and the feed and cover is excellent. While water is scarce during the dry season, it is still obtainable in sufficient quantities to maintain the herds.

In 1923 to 1925 there were reported a total of 118 antelope on this range. These have now increased to 400 or more, and represent the largest resident band now in California. In a single day's travel on foot in this region I encountered as many as four or five bands, some containing eighty-five or more animals. There is very little open range in this country, and as the antelope frequent the juniper forested table lands and plateaus, they are hard to locate. It was necessary in many cases to climb to the tops of the juniper trees to locate the animals, and it is quite possible that many bands in the neighborhood escaped my observation. The increase of young in the past season shows a very promising condition, as in some of the smaller bands the young considerably outnumber the older animals.

Comparing this section with Lassen County and game refuge 1Q, where the land is overgrazed and sheep camps monopolize most of the water holes, I found conditions quite the reverse. The bands are small and scattering, and the animals comprising them, very wild. There is a small band or two ranging in Modoc County in the neighborhood of Eagleville, but the big bands formerly ranging in Lassen County have migrated into northwestern Nevada, where they winter in the Black Rock Desert, and in summer range northward into eastern Oregon. In November, 1927, I found herds up to 500 or more in Washoe County, Nevada, watering at Swan Lake.

In 1928, I made five trips into the Lassen County antelope country and at no time did I see over thirty-five antelope in one day, and that was in February before the bands had broken up. During these various trips, I covered Grasshopper Valley, Madeline Plains, Spanish Springs, Painter Flat, Smoke Creek, Skeedaddle Creek and other portions of the 1Q refuge, and it is my opinion that the big bands formerly ranging in Lassen County now range in Nevada, and that the Lassen County resident herds do not total over 250 animals at this time.—E. S. Cheney, Oakland, California.

SPECIMEN OF MILK FISH, *CHANOS CHANOS*, DELIVERED AT SAN PEDRO

A specimen of *Chanos chanos* was found in a San Pedro wholesale fish market on February 26, 1929. This fish, three and a half feet in length, was taken off the western coast of Lower California. As far as can be ascertained, this is the first record of the delivery of the species in San Pedro.

The fish belongs to the family Chanidae, a group related to the herrings, and is known variously as milk fish, sabalo or awa. It bears a superficial resemblance to a mullet and was called a Mexican mullet by the dealer in the wholesale market.

These fishes, excellent for food, inhabit the warmer parts of the Pacific and Indian oceans, and are reported as relatively abundant in the Gulf of California. —Frances N. Clark, California State Fisheries Laboratory.

SOME NOTES ON THE BASKING SHARK

(Cetorhinus Maximus)

From time to time at San Francisco, and, more rarely at Monterey, fishermen bring in basking sharks (*Cetorhinus maximus*). As these sharks are generally of large size and are now comparatively rare, they attract much attention and, in some cases, are given space in the newspapers. Quite recently a large specimen was brought to San Francisco and on November 3, two large specimens were caught in Monterey Bay by fishermen. These were landed at a reduction plant and converted into fertilizer.

The basking shark was first described by Bishop Gunner of Norway. He published a learned dissertation attempting to prove that this was the species of fish which swallowed Jonah. The fishermen of the North Atlantic have known the basking shark for a long time under various names. In New England it is known as basking shark and sometimes as "bone shark"; in Ireland and Wales the name "sunfish" is applied to it; while

in Northern Great Britain it is called "sailfish" and in the Orkneys "hoe-mother."

Until recently the basking shark was considered a resident of only the north Atlantic and Artic oceans. It has been recorded in the Atlantic as far south as Portugal and Virginia. There are records however in Australian waters. Sir Frederick McCoy records a specimen from Portland, Victoria in 1883, which was thirty feet six inches in length. He gives a very careful and detailed description and measurements. This is the first good description we have of the basking shark. The range, therefore, would seem to include both the Arctic and the Antarctic.

Our knowledge of the basking shark is rather meager. We have specimens of it and several accurate descriptions, but from all accounts, it seems to be a rather rare fish. It grows to be thirty-six or more feet in length with a girth of twenty-five feet. It is observed for the most part lazily wallowing in the trough of a smooth sea, evidently enjoying the warmth of the sun, hence, the name basking shark. The teeth are numerous, being 200 in a row. They are small and weak, however, and are probably not of much use in procuring food. The internal openings of the gill slits carry modified gill rakers which form a straining apparatus. The gill slits extend from the back nearly to the median line on the ventral surface. The long gill rakers have somewhat the same function as the baleen in the whalebone whale, hence the name "bone shark."

From the nature of the teeth and the modification of the gill rakers, it is reasonable to suppose that the basking shark feeds on much the same material as the whalebone whales, namely plankton, and perhaps shoal water organisms.

Although seemingly indolent and sluggish, even the old time whalers hesitated before driving the harpoon into the basking shark. The big fish will allow a boat to approach close enough to touch it, but when aroused to action, the shark has both speed and endurance, and can take out line more steadily and at a faster rate than a much larger whale.

In the past, the basking shark was taken in the north Atlantic for the yield of oil from the liver. Records show as much as twelve barrels of oil have been obtained from one fish. The average yield is about eight barrels. At the present time, the fish is taken more by accident than by design. There has never been any demand for shark oil on the Pacific Coast. The rarity of the fish is another factor to be considered and a logical explanation why no fishery for them has been established. As they possess little or no commercial value and as they are inoffensive fish, never conflicting with any of man's commercial activities, they are seldom molested and go their way in peace. Occasionally, one of them accidentaly becomes entangled in a net or is taken out of curiosity and we are then afforded an opportunity of seeing one of the largest of fish.—Paul Bonnot, Stanford University, California.

ALBINO SARDINE

A mature female sardine that apparently might be an albino was caught in Monterey Bay on September 18, 1928. The fish, instead of being the characteristic dark blue above, was a bright lemon-yellow color speckled with small blue and green dots. The large blue dots on the sides were lacking. It was a brilliant silver hue below the lateral line. The dorsal and the caudal fins were lemon-yellow margined in black; while the pectorals, the ventrals, and the anal were colorless. The peritoneum instead of being black, as is customary, was white speckled with small round black dots. Upon cursory examination, the fish appeared normal except for the unusual coloration.

On several occasions albino sardines have been observed in the past, but they are a rarity.—M. J. Linder, California State Fisheries Laboratory, Terminal, California.

HUGE SKIPJACK TAKEN AT SAN DIEGO

A skipjack that exceeds in size anything heretofore known to local experts was recently received at the San Diego Natural History Museum. The fish was caught by Manuel G. Rosa, a commercial fisherman, and was donated to the museum by the Van Camp Seafood Company. Measurements taken at the museum were: length 39 inches, depth of body, without fins, 10 inches, girth 27½ inches. The weight was declared by the Van Camp Sea Food Company average 8 pounds, the phenomenal size of this individual is evident. Mr. Gillette, the museum's taxidermist, dropped all other work in order to mount the specimen which will fit nicely into a new exhibit that has been contemplated for some time, showing the fish that are packed commercially in San Diego.

A BRIEF NOTE ON A GREEN ALGA ANKISTRODESMUS

The following brief account of a green alga deleterious to fish is offered as a

supplement to a short note in CALIFORNIA FISH AND GAME, July 1928. The note appearing in the "Department of Fish Culture," reported a fatal condition of infestation noted in a collection of steelhead eggs taken at Scott Creek, Santa Cruz County. It also referred to the water in the Yosemite and Kern hatcheries. The water coming into the Kern Hatchery was found to contain large quantities of blue-green algae. At the time this was observed the gills of the fry were heavily infested with a very minute algae identified as a species of *Ankistrodesmus (Ankistrodesmus).*

FIGURE 52. A diagrammatic representation of the method of reproduction in a solitary species of *Ankistrodesmus.*

The genus *Ankistrodesmus* is a well known member of the group of algae called the green algae. The great variety of minute plants known as the desmid, are also members of the green algae. But *ankistrodesmus* is not a desmid, as the note referred to above states, and is not related, except very remotely, to the desmids.

All of the twenty-five or twenty-six species and varieties of *Ankistrodesmus* known at the present time are long, more or less spindle-shaped, one-celled plants with sharp points at each end. Some of them are straight, others are slightly or greatly curved and crescent-shaped. Still others are greatly twisted near the center and are spiral-shaped. The first two types are usually solitary.

The last type, however, usually occurs in groups of a few to many cells. In these groups the cells are ordinarily interwoven near the center with the extremities free and pointing outward in every direction presenting a formidable appearance.

These plants reproduce in great numbers by a lengthwise division of the material within the cell wall. When each of them has divided into four parts, the old cell wall softens and becomes gelatinized and ruptures, liberating four new plants, figure 52.

The various species of *Ankistrodesmus* are distributed in all parts of the world. They have been collected from sluggish streams, small ponds and other bodies of freshwater near the sea, from mountain streams at 6000 feet above the sea and from all kinds of permanent and semipermanent bodies of freshwater

FIGURE 53. A single individual of *Ankistrodesmus spiralis* (Turner) Lemmermann collected from the lower part of the Salinas River, August, 1928.

between these extremes. Generally they are found with algae of other kinds. Occasionally they are found in almost pure stands.

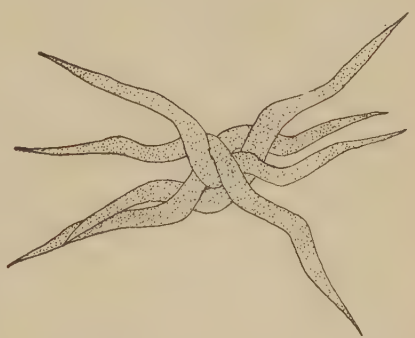

FIGURE 54. A characteristic group of individuals from the same collection. (Figures 53 and 54 magnified 950 times.)

An instance of this last kind that is of interest to persons concerned about fish culture in California happened in the summer of 1928. About August first a very nearly pure culture was taken in great abundance from the lower part of the Salinas River. The material found was the typical form of *Ankistrodesmus spiralis* (Turner) Lemmermann, figures 53, 54.—Fred Klyver, San Mateo Junior College, San Mateo, Cal.

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CONSERVATION IN OTHER STATES

FOOD PLANTED FOR MIGRATORY WATERFOWL IN OREGON

An effort has been made during the summer of 1928 to increase the food supply for migratory waterfowl by the planting of wild rice in several different sections of the state. In virtually all instances the experiments were a marked success.

Oregon is also experimenting on the introduction of sago pondweed, a favorite food of ducks, into western portions of the state. Although a common aquatic plant in lakes in eastern sections of the state, it has not been tried in coastal lakes.

This improvement of the food supply should be the means of attracting and holding large numbers of birds.

WISCONSIN SPARES THE HAWKS

The Wisconsin game commission takes exception to the theory that the only good hawks are dead hawks and declares in a circular to the public that only two kinds of hawks found in that state do any appreciable damage; namely, the Coopers and the sharp-shinned hawks. The commission protests against wholesale shooting of hawks and declares that the marsh, red-shouldered, red-tailed, and sparrow hawks are beneficial.

W. B. Grange, superintendent of game of the Wisconsin conservation commission, is authority for the classification of hawks in that state and takes the responsibility of advocating protection for all but the two kinds named above.

GUINEA FOWL TO BE TRIED IN OREGON

An experiment on the part of Mr. Simpson, superintendent of the state game farms, gives promise of success, and if it does the sportsmen of Oregon, after a few years, will hunt a new game bird in the guinea fowl. Several hundred of these birds are now being raised and plantings will be made during the coming year in the coast counties. The birds are prolific, as they start laying in February and continue until late fall. They are naturally a wild bird and can never be successfully tamed. Game departments of other states have had pronounced success with the guinea fowl.—Biennial Report of the Oregon Game Commission, 1927–1928.

MISSOURI SUPPORTS EDUCATION

Experience has shown conclusively that a large percentage of law violation is the result of ignorance. Not mere ignorance of the laws but failure on the part of the violator to understand fully the great importance of conserving our natural resources and the emergency that exists in regard to the necessity of protecting and conserving our wild life, our forests and our streams.

To meet this condition the Protection Division has carried on an educational publicity program.

Waterproof cardboard posters setting forth the facts regarding open and closed seasons and the laws governing the same have been distributed at regular intervals to the wardens, who are instructed to post them in conspicuous places throughout their districts. The field wardens have carefully checked this line of work and have made reports on all posters observed in each district.

Wardens have reported the results of activities to the local newspapers so that all might be warned and be guided accordingly.

Special attention has been given to public meetings of sportsmens' and conservationists' organizations. When requested qualified speakers have been furnished for all such occasions. Representation has been given to many chapters of the Izaak Walton League, the Kiwanis Club, the Lions Club, the Rotarians, the Randolph County Hunting and Fishing Club, the Carthage Sportsmen Protective Association, the State Rifle and Pistol Association, the Missouri Fox Hunters Association, the Ozarkians, Commercial Clubs and many other clubs and associations interested in outdoor life and conservation.

Special attention has been given to educational radio talks and the voice of the Game and Fish Department has been heard many times from St. Louis and Jefferson City broadcasting stations.—*Missouri Game and Fish News*, Vol. 5, No. 2, Feb. 1929.

TEN-POINT BULL MOOSE LEGAL IN NEW BRUNSWICK

Guides and hunters in New Brunswick this fall will be in less danger from the bullets of over-enthusiastic fellow nimrods out after moose, for a new regulation now requires all hunters to count ten before shooting. And the ten they count must be reckoned in points on the antlers of their quarry, for it is now illegal to kill a moose in New Brunswick with antlers of less than ten points. The previous regulation permitted the shooting of six-point bulls.—*Science*, Jan. 18, 1929, P. xiv.

MINNESOTA ADOPTS REFUGE POLICY

Minnesota in planning a system of game refuges has determined upon the following policy relative to them:

1. Available.
2. Of sufficient area.
3. Correct as to climate.
4. Abundantly watered.
5. Rich in natural food conditions for a varied animal life.
6. Must not be depleted of wild life and breeding stock must be at hand.
7. Accessible.
8. Must present coordinate effort looking toward reforestation as well as wild life conservation.
9. Possibility of the reserve becoming self supporting or better.

The committee in charge also became convinced that:

1. Game laws, even where well enforced do not prevent game from disappearing and becoming extinct.
2. Settlement interferes with breeding grounds and cultivation of land destroys natural feeding grounds.
3. Large areas of unsettled land are ruined for breeding and propagation by ill-advised efforts to bring non-agricultural into agriculture.
4. State and national game preserves have demonstrated that when size, food conditions, and freedom of range exist, the natural multiplication of wild life not only fills the preserve but overflows scattering wild life into adjacent areas for hundreds of miles.
5. Species threatened with extinction come back with the game refuge.
6. Finally—states provided with game refuges large in area and suitable in nature protect their wild life while states not so providing must be content to read or hear some old settler tell about fishing in the Mississippi River, shooting deer in Renville County, and hunting moose at Pine City.

MICHIGAN BANDS TROUT

The state of Michigan is banding some of the different species of trout planted from their hatcheries. The tags are narrow strips of noncorrosive metal bent in the form of a triangle. A small slot is punched in one end and the other end forms a tongue to fit through this slot. A special tool resembling pliers presses the tongue through the tail or fin of the fish and fastens it firmly in the slot, forming the tag into a long flat band. These tags are placed on fish which have attained a size of 7½ to 9 inches as smaller fish are unable to carry the tag successfully.

It is hoped that through this work information will be obtained as to where the trout migrate from the place originally planted; how fast they grow; how many survive the dangers of wild life in the creeks and rivers long enough to reach legal size; and whether some of them starve because their diet of ground liver has softened them and made them unfit to fare for themselves.

MICHIGAN OPENS SEASON ON PHEASANTS

Will the ring-necked pheasant in California fail to meet the test? Wise use of a new resource will be necessary if we judge by Michigan's experience. The opinion of the majority of Michigan sportsmen who went afield in the southern counties of the state during the seven-day upland hunting season which ended at midnight October 31, 1928, is that this bird failed to meet the test.

When the first season was opened on the ringnecks in the fall of 1925 it was generally believed that at last a variety of game had been found that would stand the gaff of hunting by the army of nimrods that takes the field each autumn now in lower Michigan.

Due to the fact that they could be bred by the thousands on the state game farm at Mason, that eggs from there could be sent out for hatching under domestic hens and the young birds released by farmers and sportsmen, and that the female could be protected, it was hoped the pheasant would escape the fate of the partridge under intensive gunning.

This fall, however, reports from almost every section of the pheasant country indicate the greatest scarcity of birds since they were placed on the open game list four seasons ago and there is every indication that the ringneck has not been able to withstand the strain imposed by Michigan's half million small game hunters.

WISCONSIN HUNTERS WARNED TO BE CAREFUL WITH LOADED GUNS

A boy's untimely death, caused by a rifle which had been carried in a car in an illegal manner, and the arrest of several hunters within a week for the same offense, recently brought a warning from the Conservation Commission of Wisconsin to hunters that it is against the law in that state to carry guns in cars unless they are unloaded and knocked down, or unloaded and in a carrying case.

An eight year old boy asked a passing motorist for a ride. When he reached his destination and stepped off the car, a loaded rifle which had been carelessly put

on the floor of the car was accidentally discharged and the bullet entered the lad's neck. He died shortly afterward.

The Wisconsin law prohibiting the carrying of loaded guns in cars is designed as much for the protection of the hunter as it is for the protection of game. Carrying loaded guns in cars is dangerous at any time, but it is particularly so in the winter when roads are rutty and rough.

BROADENED VIEWPOINT IN WISCONSIN

In the mind of the Conservation Commission of Wisconsin, conservation today means more than the propagation and distribution of game fishes, birds, and animals. It means more than mere sentimentality. To justify itself, conservation must mean the creation of conditions under which forests will grow, the restoration of our marshes and wild lands to attract bird and animal life, and the preservation of the beauties of nature which have made Wisconsin the most famous state in the middle west as a recreation and vacation land.

BEAVER PLANTING ON UPPER MISSISSIPPI RIVER

The attempts recently made to stock the Upper Mississippi River Wild Life and Fish Refuge with beaver colonies are beginning to show good results. The superintendent of the refuge, in a recent report to the United States Bureau of Biological Survey, which administers the new reservation, states that the beavers captured in northern Wisconsin last spring and liberated on the flats near Wabasha, Minnesota, are apparently doing well. Reservation rangers of the bureau recently discovered two fine new lodges constructed by the animals on a small slough near the place they were liberated. After seeing these, the superintendent stated that from the quantity of winter food collected by the beavers and submerged in front of the new lodges and from the extent the animals have cut the aspen and willow growth along the slough, there has been some increase from the pairs liberated. The fact that the beavers are remaining and building their lodges in the bottomland instead of following up some of the streams coming in from the hills, confirms the early opinion of the superintendent that the bottomlands are admirably adapted to beaver colonization. He considers it desirable to stock the bottomlands with beavers at various points along the three-hundred miles over which the refuge extends.

MISSOURI SHIPPED OVER 3,500,000 RABBITS TO NATION'S MARKETS FOR CHRISTMAS

Missouri supplied cities in every section of the country with rabbits for the Christmas trade this year. According to the Springfield Leader over 3,500,000 were shipped as far as New York, Boston and the Pacific coast cities. The value of these rabbits was $450,000. These were all of them shipped from the hill country, the Ozark section.

The St. Louis Post-Dispatch carried an item dated December 10 from Laclede, Missouri, stating that as a result of a 48-hour drive by hunters in Linn County, 5000 rabbits were killed and shipped to Chicago.

Fifteen thousand live rabbits were shipped to New Jersey in December, to replenish the depleted supply of cottontails in that once great rabbit country. New Jersey had previously imported 58,000 rabbits which came from Missouri and Kansas.

It begins to look as though Missouri is going to be compelled to pass some sort of protective legislation for the rabbit. We can not forever keep on killing them off and exporting them and at the same time maintain the supply.—*Missouri Game and Fish News*, Vol. 5, No. 1, Jan. 1929.

WISCONSIN HUNTERS AND TRAPPERS MUST WEAR BUTTONS

Every hunter and trapper in the state of Wisconsin will have to wear a button this year, according to word just received from the state conservation commissioner.

The commission has received all of the 237,000 resident hunting buttons ordered earlier in the summer. Distribution of the buttons to the county clerks will be begun in time for the county clerks to issue buttons at the same time they issue licenses.

It is expected that the new button system will save bother for the hunters and work for the wardens. It will not be necessary for a warden to ask a button-wearing hunter to exhibit his license.

The hunting buttons for residents are green in color and have a white ribbon across the middle bearing the word "Wisconsin." Above the ribbon is the year and the number of the button, which corresponds to the number of the license. Below the ribbon is carried the description of the license. All trappers will have to wear buttons too. Theirs are blue in color. Nonresident hunting licenses are yellow. The buttons are about one and three-quarters inches across and can be seen for some distance.—*Fins, Feathers and Fur*, February, 1929, p. 38.

REPORTS

FISH CASES

October, November, December, 1928

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Angling License Act	30	$665 00	60
Violations of Commercial Fishing License Act	13	175 00	360
Trout: illegal spearing and netting	14	425 00	
Black Bass: undersized	2	130 00	
Night Fishing	1	25 00	
Fishing too near dam	2	50 00	
Striped Bass: over limit and undersized	25	880 00	
Salmon: untagged, closed season and spearing of	18	1,579 00	63
Clams: undersized and over limit	31	1,552 00	46
Lobsters: undersized	21	505 00	180
Abalones: undersized and over limit	33	1,000 00	
Halibut: undersized	1	50 00	
Crabs: closed season and undersized	8	325 00	10
Catfish: undersized	1	250 00	
Sturgeon: possession of	1	25 00	
Nets, traps, lines: illegal	8	325 00	
Failure to keep commercial fishing data	2	200 00	
Spotfin Croaker: possession of	1	50 00	
Totals	212	$8,211 00	719

GAME CASES

October, November, December, 1928

	Number arrests	Fines imposed	Jail sentences (days)
Violations of Hunting License Act	106	$2,085 00	95
Deer: spiked buck, doe, untagged, fawns; closed season	53	1,965 00	200
Wood ducks: killing of	5	100 00	
Ducks: over limit; closed season and selling of	25	1,530 00	
Geese: over limit	5	250 00	30
Sea gulls: killing of	2	30 00	
Swans: killing of	1	25 00	
Shore birds: illegal killing of	34	840 00	
Doves: closed season and over limit	16	340 00	
Quail: over limit and closed season	63	2,840 00	90
Pheasants: illegal killing of	6		150
Nongame birds: killing of	56	1,465 00	60
Night hunting	55	900 00	90
Game refuge: shooting in	11	275 00	
Rabbits: closed season	8	161 00	37
Pigeons: closed season	6	175 00	
Squirrels (tree): killing of	4	235 00	
Fur trapping regulations: no license	22	482 00	19
Shooting from automobile—power boat	20	520 00	15
Dogs running deer	5	125 00	
Trespassing on posted land	18	395 00	
Possession of mountain sheep	1	300 00	
Totals	522	$15,038 00	786

SEIZURES OF FISH AND GAME

October, November, December, 1928

Halibut, pounds	317
Sturgeon	2
Black bass	11
Striped bass	121
Striped bass, pounds	300
Calico bass	5
Trout	152
Trout, pounds	86
Abalones	120
Clams	1,200
Crabs	110
Catfish, pounds	300
Salmon, pounds	664
Lobsters	1,316
Lobsters, pounds	1,300
Spotfin Croaker, pounds	125
Pigeons	14
Shorebirds	139
Wood ducks	4
Ducks	934
Quail	738
Mudhens	4
Pheasants	9
Nongame birds	113
Sea gulls	2
Doves	214
Sage hens	3
Geese	52
Rabbits	12
Deer	17
Deer meat, pounds	346
Deer hides	5
Squirrels	1
Hides, furbearing mammals	211

PLANTS OF GAME BIRDS, STATE GAME FARM, FEBRUARY 1 TO DECEMBER 31, 1928

Ring Neck Pheasants

Location	Number planted
Red Bluff	150
Santa Maria	100
Willows District	452
Alturas	100
Cedarville	100
Modesto	150
Indio	100
Colton	200
Calipatria	100
Buelton	100
Lodi	200
Salinas	150
Sanger	387
Redding	350
Chico	110
Marysville	110
Roseville	100
Woodland	100
Weed	125
Healdsburg	190
Sonoma	103
Merced	138
Crows Landing	132
Los Angeles County	16
Gonzales	115
Soledad	110
Bakersfield	150
Tulare	131
Hanford	125
Orland	125
Rosemary Farm	100
Willits	100
Ferndale	100
Guadalupe	100
Oroville	100
Fall River Mills	100
Goat Island	10
San Bernardino	118
Ontario	100
Chino	100
Oro Grande	100
McCloud	190
Marin County	184
Napa County	131
Lake County	54
Total	6,106

Display Birds in Parks and Other Places

Location	Silver pheasants	Golden pheasants	Reeves pheasants	Ringneck pheasants	Peafowl
Eureka	2	2	2		
Merced	2	2	2	5	
Los Angeles	12	12			
Santa Maria	2	2		5	
Goat Island	4	2		10	2
Arizona	2	2			
Totals	24	22	4	20	2

California Valley Quail

Location	Number planted
Bakersfield	16
Santa Cruz	100
Los Angeles County	30
Napa County	40
Goat Island	14
Total	200

Arizona Turkeys (Mexican Bronze)

Location	Number planted
Eureka	20
Fort Seward	21
Kellogg (Sonoma County)	20
Redding District	64
Total	125

Hungarian Partridges

Location	Number planted
Squaw Valley (Fresno County)	40

Total number of birds liberated, 6,543.

STATEMENT OF EXPENDITURES

For the Period July 1, 1928 to December 31, 1928 of the Eightieth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Administration:					
Executive and legal	$7,710 00	$2 90	$750 41	$495 90	$8,959 21
Clerical and office	11,302 65	570 93	2,729 14	398 21	15,000 93
Rent			3,225 43		3,225 43
Automobiles		171 57	185 25		356 82
Telephone and telegraph			2,416 84		2,416 84
Postage			1,976 03		1,976 03
Freight, cartage and express			1,419 11		1,419 11
Printing		2,656 90			2,656 90
Accident and death claims			1,478 75		1,478 75
Commissioners			96 94		96 94
Total administration	$19,012 65	$3,402 30	$14,277 90	$894 11	$37,586 96
Education:					
Director and assistants	$7,384 51	$325 23	$2,268 69	$798 63	$10,777 06
Pacific Southwest Exposition	248 75	1,014 06	1,349 13		3,611 94
Total education	$7,633 26	$1,339 29	$3,617 82	$798 63	$13,389 00
Publicity:					
Director	$1,650 00		$243 13		$1,893 13
State fair	357 00	212 21	730 71		$1,299 92
Total publicity	$2,007 00	$212 21	$973 84		$3,193 05
Conservation and protection:					
Chief and assistants	4,350 00	39 55	1,097 47		5,487 02
Clerical and office	1,500 00	16 71			1,516 71
Rent			175 14		175 14
Automobiles		420 20	274 75	14 33	709 28
Captains and deputies	106,210 88	175 55	77,238 05	202 76	183,824 24
Patrol launches	1,050 00	903 76	817 41	285 00	3,056 17
Lion hunters	653 33				653 33
Coyote trappers	358 88				358 88
Lion bounties			3,150 00		3,150 00
Fish planting	1,260 00	801 88	2,317 58		4,379 46
Refuge posting	3,344 17	193 04	797 31	3 60	4,338 12
Fish reclamation and rescue	505 00		458 22		963 22
Total conservation and protection	$119,232 26	$2,547 69	$86,325 93	$505 69	$208,611 57
Commercial fisheries:					
Chief and assistants	$4,470 00	$445 53	$918 92	$436 71	$6,271 16
Deputies	14,919 61	51 64	4,111 80		19,083 05
Patrol launches	1,590 00	1,042 98	1,191 89	22 20	3,847 07
Statistical	3,175 00	7 08	160 78		3,342 86
Laboratory	18,443 39	695 80	3,388 89	205 63	22,733 71
Salmon tagging			39 50		39 50
Botulism			7,500 00		7,500 00
Automobiles		149 16	150 59		299 75
Carp eradication	1,485 84	315 10	240 35		2,041 29
Total commercial fisheries	$44,083 84	$2,707 29	$17,702 72	$664 54	$65,158 39
Fish culture:					
Chief and assistants	$2,265 00	$7 18	$226 07	$26 50	$2,524 75
Clerical and office	2,070 67	25 33	134 94	158 55	2,389 49
Rent			61 00		61 00
Automobiles		1,819 80	1,040 65	52 55	2,913 00
Hatcheries	67,640 33	34,675 73	10,991 00	4,586 65	117,893 71
Hatcheries—additions and betterments				493 27	493 27
Special field investigation	4,530 00	1 50	1,973 16	7 18	6,511 84
Fish reclamation and rescue	971 00	11 42	411 92		1,394 34
Total fish culture	$77,477 00	$36,540 96	$14,838 74	$5,324 70	$134,181 40
Hydraulics:					
Chief and assistants	$2,820 00	$189 00	$820 33	$51 32	$3,880 74
Cooperative research work	$1,500 00		$129 78		$1,629 78
Total hydraulics	$4,320 00	$189 00	$950 11	$51 32	$5,510 52

STATEMENT OF EXPENDITURES—Continued

For the Period July 1, 1928 to December 31, 1928 of the Eightieth Fiscal Year

Function	Salaries and wages	Materials and supplies	Service and expense	Property and equipment	Total
Game propagation:					
Game farm—Yountville	$4,745 44	$4,321 92	$1,297 68	$836 12	$11,201 16
Automobiles		56 66	55 71		112 37
Total game propagation	$4,745 44	$4,378 58	$1,353 39	$836 12	$11,313 53
Research:					
Chief and assistants	$7,095 03	$220 29	$956 94	$70 00	$8,342 26
License commissions			$28,430 25		$28,430 25
Total Division of Fish and Game	$285,606 48	$51,537 70	$169,427 64	$9,145 11	$515,716 93

	Detail	Total
License sales:		
Angling, 1927	$1,040 00	
Angling, 1928	250,549 20	
Angling, 1929	75 00	
Hunting, 1928	216,844 00	
Hunting, 1929	335 00	
Market fishermen's licenses, 1928–1929	28,120 00	
Wholesale fish packers' and shell fish dealers', 1928–1929	925 00	
Game breeders' licenses, 1928	102 50	
Game breeders' licenses, 1929	12 50	
Fish breeders' licenses, 1928	55 00	
Trapping licenses, 1928–1929	4,272 00	
Commercial hunting club, 1928–1929	2,025 00	
Commercial hunting club operators' licenses, 1928–1929	575 00	
Deer tag licenses, 1928	88,036 80	
Total license sales		$592,967 00
Other income:		
Game tag sales	$29 34	
Court fines	45,607 30	
Fish packers' tax	59,226 44	
Kelp tax	10 48	
Fish tag sales	3,162 27	
Crawfish inspection	21 00	
Miscellaneous sales	253 53	
Interest on bank deposits	2,952 98	
Total other income		$111,263 34
Total income		$704,230 34

CALIFORNIA FRESH FISHERY PRODUCTS FOR THE MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1928

Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

Species of fish	Del Norte, Humboldt	Mendocino, Sonoma, Lake	Marin	Solano, Yolo	Sacramento, San Joaquin	Alameda, Contra Costa	San Francisco, San Mateo	Santa Cruz	Monterey
Anchovies							4,210		1,970
Barracuda									956
Bonito									
Carp				193	7,396	1,981			
Catfish		17,375		1,718	81,644	54,302			
Cultus Cod	730	11,277	125				119,853	11,178	63,996
Flounders	400	7,590					49,434	1,087	477
Grayfish							234,177	8,130	25,850
Hake							21,747	1,750	
Halibut	43,549	257					7,785	605	5,631
Hardhead					28,067				
Herring			80,808			2,550	74,300	125	
Kingfish							4,592	6,009	18,185
Mackerel							2,127	889	290,892
Mackerel—Horse									21,658
Mullet									
Perch	2,357		9,162				8,497	22	1,380
Pike				108	203	793			
Pompano									
Rock Bass									
Rockfish	12,950	8,856					224,032	78,949	476,992
Sablefish	110,340						79,845	90,863	15,977
Salmon	137,203			452	325	1,184			
Sandabs		5,200					228,270	19,677	1,559
Sardines							16,439,791	250	47,009,406
Sculpin								607	789
Sea Bass—Black									
Sea Bass—White			10,274				11,279	160	304
Shad				1,500	245	3,976			
Shad—Buck					72	294			
Shad—Roe						16			
Sheepshead									
Skates							133,616	4,455	33,004
Skipjack								82	
Smelt	1,536		7,066			531	6,787	7,898	10,296
Sole	53	44,210					1,891,529	251,233	26,595

Splittail					3,000				
Striped Bass			90	9,544	19,469	52,534			
Swordfish									
Tomcod							1,450		
Tuna—Bluefin									
Tuna—Yellowfin									
Turbot			52				600		
Whitebait			22				1,206		75
Whitefish									
Yellowtail									
Miscellaneous	85	1,170			34		4,052	671	3,067
Total fish	309,203	95,935	107,599	13,515	140,455	118,161	19,549,179	484,640	48,009,059
Crustaceans:									
Crabs	[1]9,336					[3]312	[4]751,392	[6]43,080	[7]72
Shrimps			395,420				49,936		
Spiny Lobsters									
Mollusks:									
Abalones									321,350
Clams—Cockle			5,187						
Clams—Mixed	2,664								
Clams—Pismo								45	1,314
Clams—Softshell			17,096			12,285	9,448		
Cuttlefish							176	25	1,239
Oysters—Eastern			[2]183,616				[5]93,500		
Oysters—Native							5,050		
Squid									53,792
Miscellaneous:									
Turtles									
Totals	321,203	95,935	708,918	13,515	140,455	130,758	20,458,681	527,790	48,386,826

All amounts shown in pounds unless otherwise specified. Albacore and skipjack cleaned.

[1] 389 dozen.
[2] 834,620 shell oysters.
[3] 13 dozen.
[4] 31,308 dozen.
[5] 425,000 shell oysters.
[6] 1,795 dozen
[7] 3 dozen.

CALIFORNIA FRESH FISHERY PRODUCTS FOR THE MONTHS OF OCTOBER, NOVEMBER AND DECEMBER, 1928

Compiled by Division of Fish and Game, Bureau of Commercial Fisheries

Species of fish	San Luis Obispo, Santa Barbara, Ventura	Los Angeles	Orange	San Diego, Imperial	Total	Fish from South of the International Boundary brought into California via San Pedro	Fish from south of the International Boundary brought into California via San Diego	Total fish from south of the International Boundary brought into California
Anchovies		4,415			10,595			
Barracuda	147	38,820	970	34,137	75,030	1,091,231	83,535	1,174,766
Bonito	112	24,997		5,780	30,889	642,790	21,957	664,747
Carp					9,570			
Catfish					155,039			
Cultus Cod	20	145			207,324			
Flounders		250			59,238			
Grayfish		32,676			300,833			
Hake					23,497			
Halibut	53,195	46,700	135	8,633	166,490	1,123	17,058	18,181
Hardhead					28,067			
Herring	80			15,589	173,452			
Kingfish		82,404	60	1,167	112,417			
Mackerel	3,279	15,291,162	319,494	740,360	16,648,203		11,196	11,196
Mackerel—Horse		170,418			192,076	1,544		1,544
Mullet			11	1,945	1,956		10,302	10,302
Perch	1,101	19,056			41,575		100	100
Pike					1,104			
Pompano		245			245		606	606
Rock Bass	1,685	23,443	22,783	18,066	65,977	7,389	24,581	31,970
Rockfish	12,524	339,863	1,084	204,068	1,359,318		4,938	4,938
Sablefish		23	15		297,063			
Salmon					139,164			
Sandabs		2,422			257,123			
Sardines	97	70,281,437	20	57,740	133,788,741			
Sculpin		11,372	727	16,287	29,782			
Sea Bass—Black	220	8,990	9,970	27,415	46,595	8,648	79,161	87,809
Sea Bass—White	8,402	38,044	6,490	26,997	101,950	104,746	56,659	161,405
Shad					5,721			
Shad—Buck					366			
Shad—Roe					16			
Sheepshead	577	115,866	747	16,135	133,325	188		188
Skates		6,414		765	178,254			
Skipjack	112	53,458		153,864	207,516	1,723,421	2,710,838	4,434,259
Smelt	1,827	86,571	67,029	4,677	194,218	1,092		1,092
Sole	26,580	10,051		1,685	2,251,936			

Splittail					3,000			
Striped Bass					81,637			
Swordfish		55,443	487	49,088	105,018			
Tomcod					1,450			
Tuna—Bluefin				1,027	1,027			
Tuna—Yellowfin		6,804		79	6,883	3,463,758	7,056,468	10,520,226
Turbot					652			
Whitebait					1,303			
Whitefish		36,095	339	33,605	70,039	1,287	4,260	5,547
Yellowtail		37,907	49	151,883	189,839	223,991	298,590	522,581
Miscellaneous		17,719	731		27,529	617	3,342	3,959
Total fish	109,958	86,843,210	431,141	1,570,992	157,783,047	7,271,825	10,383,591	17,655,416
Crustaceans:								
Crabs					[a]804,192			
Shrimps					445,356			
Spiny Lobsters	32,610	106,629	15,109	61,063	215,411	350	225,672	226,022
Mollusks:								
Abalones	4,359				325,709			
Clams—Cockle					5,187			
Clams—Mixed		25			2,689			
Clams—Pismo	23,715				25,074			
Clams—Softshell					38,829			
Cuttlefish					1,440			
Oysters—Eastern					[b]277,116			
Oysters—Native					5,050			
Squid					53,792			
Miscellaneous:								
Turtles							155	155
Totals	170,642	86,949,864	446,250	1,632,055	159,783,047	7,272,175	10,609,418	17,881,593

[a] 33,508 dozen.
[b] 1,259,620 shell oysters.

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